

Power Harvesting

The world around us vibrates; a variety of natural and human sources give a literal meaning to *panta rhei*. These vibrations can be unintended, discomforting and inevitable. Moreover, they are generally redundant. Power harvesting is the conversion of mechanical motion to electrical energy and hence contributes to a sensible use of these type of redundant vibrations and therefore to a more sustainable world.

The key of power harvesting is found in the ability of certain (mostly ceramic) materials to convert a periodically applied strain into a voltage. Typical characteristics are:

- Limited amount of energy
- Low maintenance (no rotating parts)
- Long endurance

Power harvesting is therefore most suitable for applications at locations with limited access.

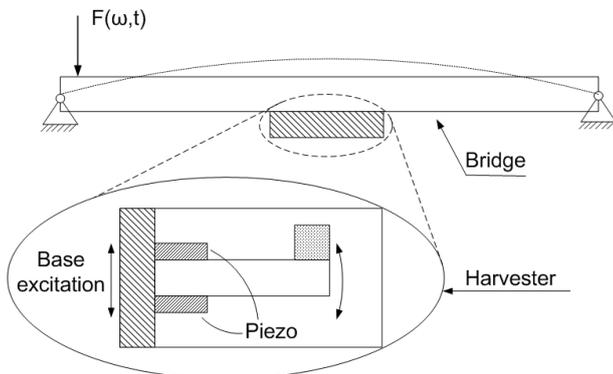


Figure 1: General concept of power harvesting on a bridge, where the periodic excitation of traffic acts as the source of vibration.

Applications to a Road

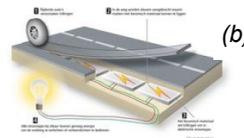
A main civil source of vibrations is traffic. Evidently, the goal is not to induce additional vibrations, but to use the inevitable vibration, for example originating from traffic passing a bridge transition. Another example is the vibration of a rail induced by a passing train. The vibrations in the structure can be transferred to a small

system with a harvester unit mounted on it. The energy generated can be used to measure specific variables, such as temperature and to send the data wireless to a base station, typically located at a more accessible place.

Afstudeerproject leidt tot proeftraject op N34

Tauw en UT halen energie uit wegdek

Energie oogsten op autowegen



PRIJS VOOR PROJECT UT, TAUW EN PROVINCIE
Sensor haalt energie uit trillend wegdek

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Figure 2: UT and Tauw in the newspapers (a) Technisch weekblad, (b) Trouw and (c) UT nieuws.

“Mooi Nederland”

The Dutch government stimulates sustainable solutions for civil applications by the subsidy “Mooi Nederland”. The project proposal of the engineering office Tauw and Applied Mechanics was granted. A bridge transition including a power harvester will be built in a normal road (N34). The aim is to investigate the effectiveness and robustness of a number of piezo based power harvesting concepts in a real (out of laboratory) environment. The results are intended to be used for the further development of sustainable civil application employing piezo based power harvesting units.

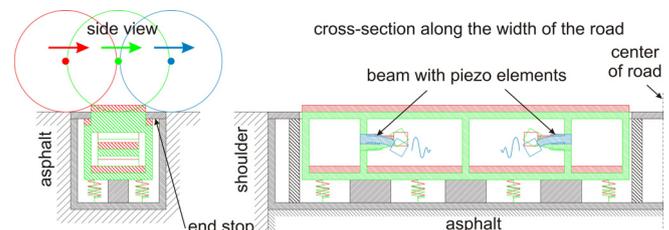


Figure 3: Power harvester in a road. Initial situation in red, the main frame is pushed down when the car tire passes (green) and jumps back to the original position (blue) when the tire has passed resulting in a vibration of the beam with piezo.