

Wrocław University of Technology Institute of Materials Science and Applied Mechanics

## **CONTINUUM MECHANICS DIVISION**

## ELECTRONIC PRODUCTS FOR HARVESTING APPLICATIONS

We design various groups of harvesters, mainly with the magnetic core ("Pulse Power Supply"), for use as power supplies which are capable of producing tens of watts in a few milliseconds.

Type of application forces the shape of an electronic system. An important issue is the need to use batteries. Different types of harvesting power supplies and situations when we use additional batteries are discussed. The development of miniature nets of solid-state harvesters with magnetic core, as well as work on the miniature termogenerators TEG and supercapacitors built into the structure, resulted in the need to develop an integration and harvesting network management system for the "low power" application. Multi-node harvesting structure can be used in SHM applications to recovery the largest electric power, which is normally wasted.



Properly selected conditioning circuit provides the harvesting system with a certain current and voltage output. The creation of a wireless node to measure certain physical quantities and to monitor the level of recovered energy requires selection of an appropriate hardware platform such as a microprocessor and wireless transmission system. One of the main objectives of our work is to eliminate wiring in places which are difficult to access. Our team has the following platforms for microprocessors, which are selected depending on application requirements:

Family line	Supply voltage [V]	Architecture [bit]	<u>Current consumption</u> /1 [MHz] [μΑ]	Clock [MHz]	Performance	Company
AVR XMEGA	1.6 - 3.6	8	260 [μA] @ 1.8 [V]	32	32 MIPS	ATMEL
MSP430	2.5 - 5.5	16	330 [µA] @ 3 [V]	5	8 MIPS	TEXAS INSTRUMENTS
PIC24F16	1.8-3.6	16	180 [μA] @ 1.8 [V]	32	16 MIPS	MICROCHIP
STM32L15x	1.65 - 3.6	32	233 [µA]	32	33.3 DMIPS	ST ELECTRONICS
EFM32	1.85 - 3.8	32	180 [µA]	48	60 DMIPS	ENERGY MICRO
AVR32UC3L	1.62 - 3.6	32	260 [µA]	50	64 DMIPS	ATMEL

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