



SILESIA UNIVERSITY OF TECHNOLOGY
FACULTY OF ELECTRICAL ENGINEERING

Department of Power Electronics, Electrical Drives and Robotics

Master's thesis

To be determined

Student:	Igor Aleksander JANKIEWICZ
Transcript no.:	285947
Type of studies:	Extramural studies (MSc programme)
Field of study:	Electrical Engineering
Programme:	To be determined
Supervisor:	PhD. EEng. Andrzej Latko

Gliwice 2020

CONTENTS

CONTENTS

1	What is Energy Harvesting?	4
2	Operational amplifier selection	4
	References	5

1 WHAT IS ENERGY HARVESTING?

Energy Harvesting is a process of using ambient energy by converting it into a usable form, i.e. electricity or heat. It is important to point out that energy harvesting has been around for quite a long time, since solar panels, wind turbines and water turbines are in constant use for a few decades, providing people with environmentally clean energy [1].

There are some important issues related to any energy source that could be potentially used for harvesting. First of all, it is crucial to evaluate intensity and availability of that source. Subsequently, one should find out a cost-effectiveness of the solution as well as the influence of the harvesting process on the primary energy source [1].

Vibration-based Energy Harvesting incorporates a number of different fields of study, i.e. material science, mechanics or electrical engineering, just to name a few. Last sentence implies that the analysis of a piezoelectric generator itself is not a straightforward process. The electromechanical response of this device relies thoroughly on the source of ambient energy [2].

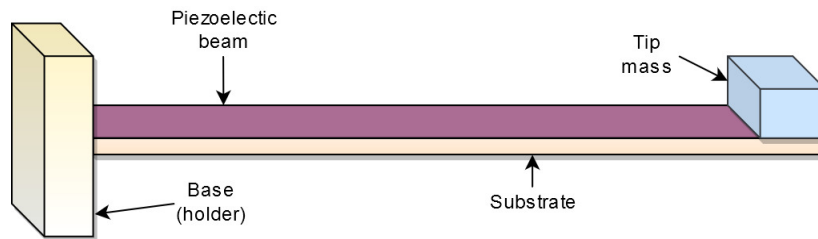


Table 1.1: Common data for some of Energy Harvesting Sources [1]

Type	Conditions	Power Density	Area or Volume	Energy/Day
Vibration	$1m/s^2$	$100\mu W/cm^3$	$1cm^2$	$8.64J$ (continuous vibration)
Solar	Outdoors	$7500\mu W/cm^2$	$1cm^2$	$324J$ (sunny half a day)
Solar	Indoors	$100\mu W/cm^2$	$1cm^2$	$4.32J$ (sunny half a day)
Thermal	$\Delta T = 5^\circ C$	$60\mu W/cm^2$	$1cm^2$	$2.59J$ (heat available for half a day)

2 OPERATIONAL AMPLIFIER SELECTION

Random citation [1] embeddeed in text.

$$I = I_{PV} - I_D - I_{sh} \quad (2.1)$$

The equation 2.1 is a typical power series.

REFERENCES

- [1] N. W. Stephen Beeby, *Energy Harvesting for Autonomous Systems*. Artech House, 2010. ISBN: 978-1-59693-718-5.
- [2] D. J. I. Alper Erturk, *Piezoelectric Energy Harvesting*. John Wiley & Sons, Ltd, 2011. ISBN: 978-0-470-68254-8.