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**Project Title:** Feasibility of nanogenerator technology utilization to supply low power electronic devices

<b>Department:</b>	Instrumentation	<b>Employer:</b>	NRI
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<b>Project Financial Code:</b>	510002	<b>Project Quality Code:</b>	PCNPN38
<b>Type of Project/Program:</b>	NRI	<b>Assistant:</b>	Research

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**Project Necessity:** Energy extraction is the process of extracting different types of energy from the environment using different methods. Energy is very important in today's world and due to its increasing consumption, energy supply will not be possible only with the use of fossil fuels. Therefore, the conversion of other types of energy to electrical energy seems to be an effective proposal to overcome the global energy crisis. On the other hand, today, the use of electronic equipment has become an integral part of community life. These devices need an energy source, and after decades of production of portable and wireless miniature electronic equipment, the existence of new, independent energy sources without the need for maintenance for these systems seems necessary.

Nanogenerators are devices invented to meet this need. These devices capture mechanical and thermal energy in the environment and convert it into electrical energy, and can be a very good source of energy for micro and nanosystems such as microbots, wireless sensors and low-power electronic devices. Therefore, nanogenerators can be used in the future in many areas as a stable, clean and low-volume energy source.

**Project Goals:** The aim of this work the study the feasibility of energy harvesting using nanogenerator technology for use in supplying energy required for low power electronic equipment.

**Abstract:** Emerging industries and technologies have attracted global attention due to issues such as the energy crisis, financial crisis and climate change. Among the emerging technologies, nanogenerator technology has been introduced to capture and store the energy of the environment to use in small scale. Among various energy sources, mechanical energy is a desirable source of energy for energy extraction due to its abundance and easy access, which is found in abundance in the surrounding environment at most times and places. Nanogenerators are one of the ways to utilize this free and available energy to convert the small movements and vibrations into electrical energy. Therefore, nanogenerators can be used in the design of self-powered devices. In this research, the types of nanogenerators, their working modes and the principles of their theory will be discussed. The applications of nanogenerators will be explained and examples of each application will be provided. In the following, the application of nanogenerators as a power source for devices will be explained in detail. The main performance indicators of TENG are explained. Then, self-charging systems and direct current TENG systems are presented. In

the following, as an example, the use of nanogenerators to supply the energy required by mobile phones is studied. Then, the current situation of nanogenerators in the world will be examined. Then, the prospects and challenges of developing this technology will be explained. Finally, based on the studies and studies, proposed research ideas to address the challenges and development of nanogenerator technology in use as a power source for electronic equipment will be presented.

### **Steps and Methodologies:**

- 1- Introducing nanogenerator technology
- 2- Examining the indicators of using nanogenerators as a power source
- 3- Observing technology and presenting proposed research ideas

### **Main Results (technical outputs, patents, papers, books, reports, etc.):**

- 1- 45 research ideas
- 2- Final Project document of "Feasibility of nanogenerator technology utilization to supply low power electronic devices", Instrumentation department, Niroo Research Institute (NRI), August 2020.