



# **Vivekanand Education Society's Institute of Technology**

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(Affiliated to University of Mumbai, Approved by AICTE & Recognized by Govt. of Maharashtra)

## **Criteria 1.3 : Curriculum Enrichment**

**1.3.3 Percentage of students undertaking project work/ field work/ internships (Data for the latest completed academic year) -2020-21**

### **Department of Artificial Intelligence & Data Science**



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## List of First Year Students Mini Projects 2020-21

<b>Group 1 D1</b>	Yash Sarang	<b>Dr. Jessy P. J/ Dr. Manisha Tiwari</b>	<b>Automatic sanitizer dispenser</b>	<b>5</b>
	Manav Pahilwani			
	Om Gaydhane			
	Madhusudhana Naidu			
	Akshat Tiwari			
<b>Group 2</b>	Sahil Parab	<b>Dr. Jessy P. J/ Dr. Manisha Tiwari</b>	<b>Hydraulic lift</b>	<b>5</b>
	Muhammad faayez			
	Shreya singh			
	Parth suryavanshi			
	Surabhi Tambe			
<b>Group 3</b>	Akshiti Kachhawah	<b>Dr. Jessy P. J/ Dr. Manisha Tiwari</b>	<b>Laser Security System</b>	<b>5</b>
	Sarthak D Bansod			
	Shubham Hadawle			
	Shambhu Patil			
	Prasad Jawale			
<b>Group 4</b>	Harsh Rohra	<b>Dr. Jessy P. J/ Dr. Manisha Tiwari</b>	<b>Piezoelectric Effect</b>	
	Manas Lalwani			



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	Subrato Tapaswi			5
	Anushka Kulkarni			
	Harshita Anala			
<b>Group 5</b>	Abhishek Thorat	Dr. Jessy P. J/ Dr. Manisha Tiwari	Air Quality Sensor	
	Govind Tiwari			5
	Omkar Korade			
	Om Bhatia			
	Arunim Chakraborty			
<b>Group 6</b>	Vemburaj Konar	Dr. Jessy P. J/ Dr. Manisha Tiwari	Wireless Power Transmission System	
	Prathmesh Pawar			5
	Akanksha Singh			
	Tanvi Kate			
	Rohan singh			
<b>Group 7</b>	Saransh Badlani	Dr. Jessy P. J/ Dr. Manisha Tiwari	Automatic Street light control using LDR	
	Mahindra Chetwani			5
	Shruti Devlekar			
	Surya Ganiga			
	Arnav Singhal			
<b>Group 8</b>	Jayesh Agrawal	Dr. Jessy P. J/ Dr. Manisha Tiwari	Vertical Windmill	
	Ashish Gupta			6
	Gargi Kachane			
	Atharva Khangar			
	Hrishikesh Kudale			



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	Abhhijay Sharangdhar			
<b>Group 9</b>	Sheryl Bellary	Dr. Jessy P. J/ Dr. Manisha Tiwari	Automatic Rainwater Detector	5
	Sheetal Dixit			
	Nikita Jethani			
	Janhavi Khanvilkar			
	Arya Kurup			
<b>Group 10</b>	Mayur Pimpude	Dr. Jessy P. J/ Dr. Manisha Tiwari	Solenoid gun	2
	Saket Shaurya			
<b>Group 11</b>	priyanshu Singh	Dr. Jessy P. J/ Dr. Manisha Tiwari	object detector using ultrasonic sensor	5
	Deepak prasad			
	sneha kadambala			
	Tejas patne			
	Nimisha jain			
<b>Group 12</b>	Naresh Shewkani		Automated Night Lamp	5
	Himanshu Sharma			
	Siddhant Dongre	Dr. Jessy P. J/ Dr. Manisha Tiwari		
	Rupesh Dhirwani			
	Kshitij Shidore			
<b>Group 13</b>	Satyam Dubey		Accelerometer & Gyroscope	



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	<b>Soham Jadiye</b>	<b>Dr. Jessy P. J/ Dr. Manisha Tiwari</b>		<b>5</b>
	<b>Pranav Kotkar</b>			
	<b>Yash Pandey</b>			
	<b>Avanish Srivastava</b>			



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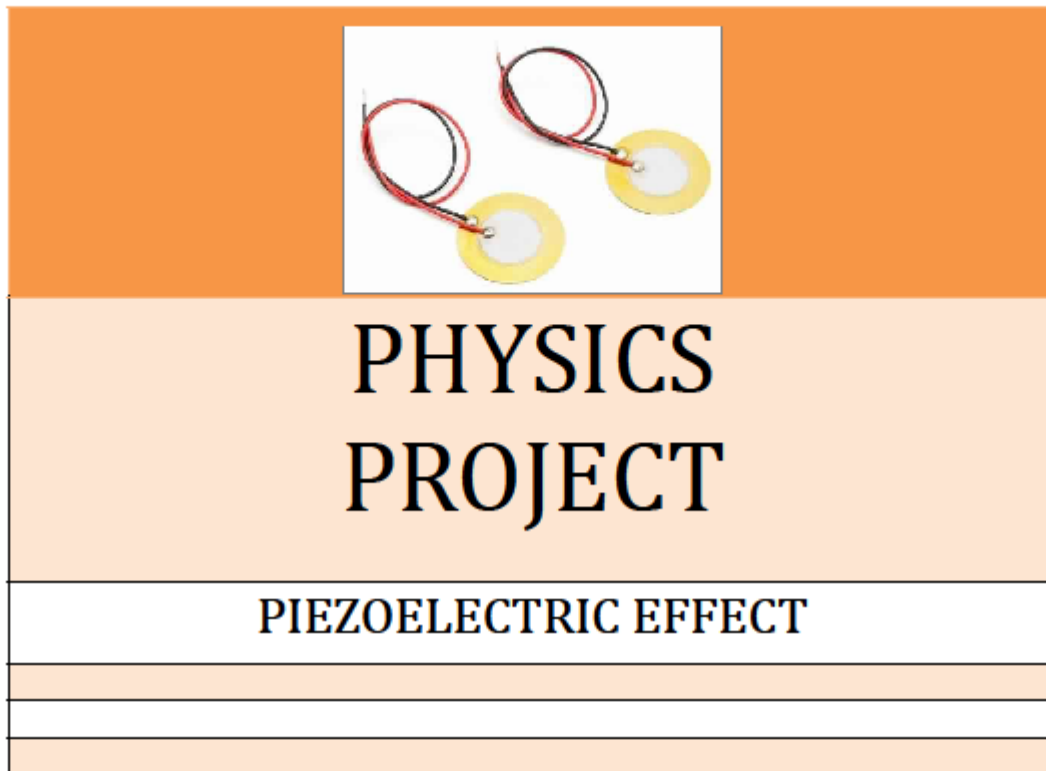
## **Sample Mini Project Report**



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The slide features a central image of three piezoelectric sensors (yellow circular discs with wires) on an orange background. Below the image, the text 'PHYSICS PROJECT' is written in large, bold, black letters. Underneath that, 'PIEZOELECTRIC EFFECT' is written in smaller, bold, black letters. The slide is divided into several horizontal sections by thin lines.

**Made by:**

2- Harshita Anala

32- Anushka Kulkarni

34- Manas Lalwani

45- Harsh Rohra

60- Subrato Tapaswi

**Class - D1AD**



**YOU CAN PRODUCE ENERGY JUST BY WALKING !**



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## Introduction

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In the last few years, the use of electronic devices has increased rapidly. The devices are used in a large number to comfort our daily lives. With the increase in energy consumption of these portable electronic devices, the concept of harvesting alternative renewable energy in human surroundings has arisen a new interest among us. In this project we have tried to develop a piezoelectric generator. That can produce energy from vibration and pressure available on some other term (like people walking).

This project describes the use of piezoelectric materials in order to harvest energy from people walking vibration for generating and accumulating the energy. This concept is also applicable to some large vibration sources which can be found from nature. This project also represents a footstep of piezoelectric energy harvesting model which is cost effective and easy to implement.

**Piezoelectric Effect** is the ability of certain materials to generate an electric charge in response to applied mechanical stress. The word **Piezoelectric** is derived from the Greek piezein, which means to squeeze or press, and piezo, which is Greek for "push".





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## THEORY & PRINCIPLE

### Piezoelectricity

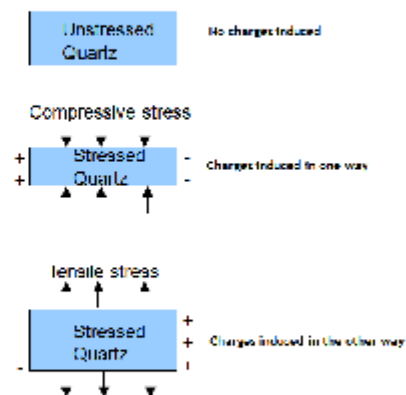
Piezoelectricity is the electric charge that accumulates in certain solid materials (such as crystals, certain ceramics, etc.) in response to applied mechanical stress.

The word piezoelectricity means electricity resulting from pressure and latent heat.

It was discovered in 1880 by French physicists Jacques and Pierre Curie.

### What is the Piezoelectric Effect?

The piezoelectric effect refers to a change in electric polarization that is produced in certain materials when they are subjected to mechanical stresses. This stress-dependent change in polarization manifests as a measurable potential difference across the material.





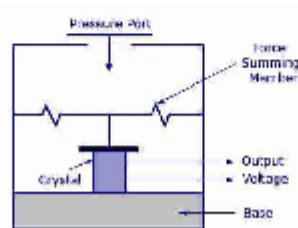
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## Piezoelectric Transducer

The Piezoelectric transducer is an electroacoustic transducer used for conversion of pressure or mechanical stress into an alternating electrical force. The EMF develops because of the displacement of the charge i.e. when pressure is applied to the surface of the Transducer voltage is produced.



Piezo Electric Transducer

The Piezoelectric crystal is direction sensitive. The polarity of the voltage depends on the direction of the force which is either tensile or compressive. The magnitude and the polarity of the charges depend on the magnitude and the direction of the applied force..



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## OBSERVATIONS

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The experiment has been carried with the help of 10 piezoelectric discs.

Area of each disc =  $8\text{cm}^2$

Potential difference produced in 10 discs =  $2\text{V}$

Current produced from 10 discs =  $2\text{mA} = 2 \times 10^{-3} \text{A}$

Therefore,

Power generated =  $V \times I = 4 \times 10^{-3} \text{W}$



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## CALCULATIONS

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From the observations made from the simple piezoelectric generator we now calculate an estimated energy output for a flight of stairs in a public space.

Area of one staircase =  $30 \times 200 = 6000 \text{ cm}^2$

Area of one piezo disc =  $8 \text{ cm}^2$

No. of piezo discs that can placed on one staircase = 750

Power produced per staircase =  $750 \times 4 \times 10^{-3} \text{ W}$   
= 3 W

Energy produced per staircase =  $3 \times 3600$   
= 10800 Wh  
= 10.8 kWh

For a flight of stairs (15 stairs )

Total energy = 16.2 kWh

At 40% efficiency,

**Total energy output = 6.5 kWh**



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## Conclusion

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We thus conclude that piezoelectricity if harnessed efficiently can help to produce quite a large amount of energy for fulfilling our daily needs.

Just a flight of stairs can produce energy up to 6 to 7 kWh when worked at less than 50% efficiency.

Piezoelectricity is thus a good source for energy generation in the future.

This can be used in schools, railway stations, malls and other crowded places to generate electricity.



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## Real Time Applications



- In 2006, Japan East Railway Company installed piezoelectric floors at an exit gate of Tokyo Station. The 6m<sup>2</sup> piezoelectric floor was reported to generate a maximum energy of about 6 kWh per day.

- The Green Microgym in Portland, Oregon has cut its energy bills by more than 65% using piezoelectric effect by capturing energy produced by runners on specially designed treadmills and exercise machines.



- In a pilot study conducted by Technion Israel Institute of Technology, a 10 m stretch of piezoelectric floors were laid on a highway in Israel. The average daily output of energy was more than 2 kWh.

- The Club4Climatedance club in London installed piezoelectric floors to utilize the energy of the footsteps and generate electricity. About 34% of the club's energy needs are being fulfilled by the piezo floors.





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## FUTURE SCOPE

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With the ever increasing demand of energy over the globe, the emphasis on the use of renewable sources of energy for sustainable growth and being eco-friendly, has increased too. The solution for this can well be piezoelectric effect.

Piezoelectric floors can be used in areas with high-rush and frequent movement. Some examples of these places are railway stations, airports, foot-over bridges, dance clubs, even schools and colleges. These places have a large amount of footfall and when people walk on the piezoelectric floors, they will generate electricity with their footsteps. As the power generated by a single disc is very small, we have to use a large number of piezoelectric discs together and connect it to a storage device, something like a generator which has to be charged up and can be used later on.

If implemented with the right scientific and technical know-how in these types of areas, the energy can be provided at a large scale with reasonable installation cost and low maintenance cost.



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