PIMPRI CHINCHWAD EDUCATION TRUST'S

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE- 411044.

MINI PROJECT SYNOPSIS

Earth Tile

Project ID:- (A1-05)

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DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION

T.E. (E&TC) 2020-2021

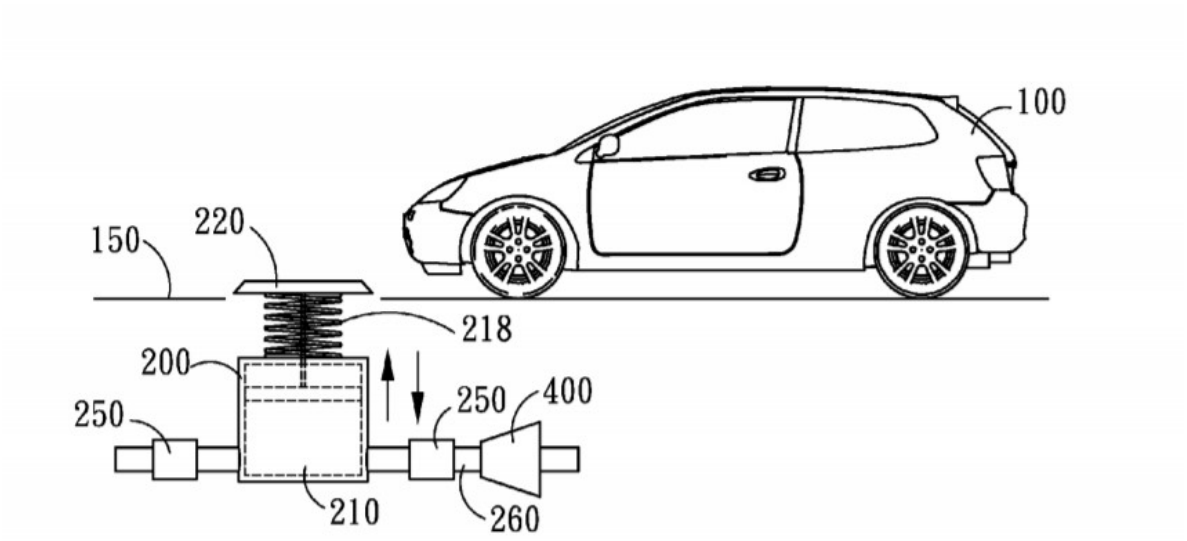
MINI -PROJECT SYNOPSIS

TITLE: A project which can make use of self-weight energy and convert it into Electricity.

ABSTRACT :

INTRODUCTION:

In order to Achieve electrical energy from mechanical energy we have constructed a model where, when someone applies force on model then it creates pressure on the piezoelectric sensors, which are present in between two tiles. Single piezoelectric sensor will produce few watts of energy and to create more amount of energy we have a parallel and series connection as to get required output voltage and current. These sensors converts the Mechanical energy (Force) into Electrical energy. The produced energy is in the form of AC which is rectified by the Rectifier circuit and then the rectified voltage is regulated to get the constant DC. Then this DC voltage can be used to light the street lights, traffic signals.



LITERATURE REVIEW:

- **Problem Survey:**

  - We have surveyed about Electricity crisis in India in a Nutshell. Power resources in India are as follows-
    - Renewable source (89%) 2. Non-Renewable (11%)

  - So, we infer that India largely depends on Non-Renewable energy sources for Power generation. But these all non-renewable sources have large scale effects on environment.

Sr. no	Type of resource	Percentage (%)	Negative Impact
1	Thermal	66	Changes Ecosystem, Material requirement is large, Exploitation of Fossil fuels, Impacts on Health
2	Nuclear	2.56	Radioactive Waste, Extremely High cost, Major Impact on Human life.
3	Hydro	20.76	Huge methane and CO2 Emission, Disturbance to Habitat, Diverting natural Waterway

  - Even the Renewable sources like Solar Energy (High maintenance cost, Only harnessed when sun is out) and Geo-Thermal (Emits poisonous Gases, High investment) have side-Effect.

  - The Solution – More than 30% of Indians prefer Walking for any kind of work. How does this "Walking" Mode solves problem of electricity? The answer is PIEZOELECTRICITY.

- **Working of Piezoelectric Sensor**

  1. Piezoelectric crystal when placed between two metal plates, the material is in perfect balance and does not conduct an electric current. When Mechanical pressure is applied to material by metal plates, it forces electric charges within crystal out of balance.

  2. Excess negative and positive charges appear on side of crystal face.

  Fig 1) At start, Net charge = 0

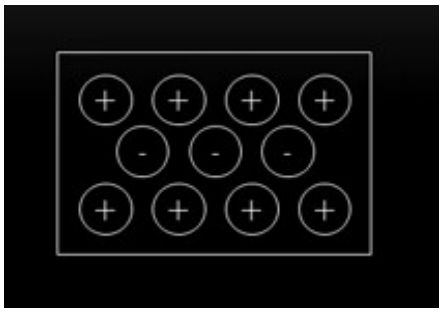
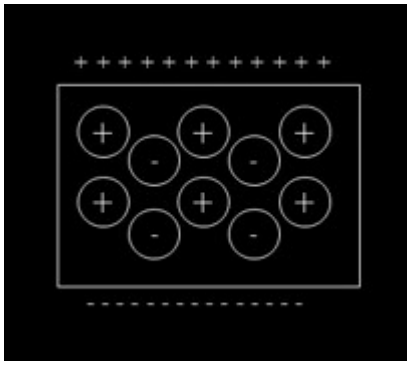


Fig 2) Shift of equilibrium state, leads to accumulation of charges on opposite ends



- **Case Study:**

- For 7V output voltage --> 12*10^-6 Amps of Output current is observed.
- So, for 40V output voltage --> (12/7)*40*10^-6 == 68.35*10^-6 Amps output current.

- Power = V*I = 40*68.35* mu Watts
- = **2.734 milli Watts**

- If we consider mall or crowded area:
  - AREA covered -> 250 sqm
  - average footfall -> 35000 people
  - If around 70% of people step on our tile then Effective footfall -> 24500
  - Average person walks 250 steps in 250sqm
  - Total steps = 24500*250 = **6125000 steps**

- 1 step = 2.73 milli watt
- Total energy = 612000*2.73 milli watt = 16721.25 Watt = **167.25Kwh**
- if we consider efficiency of 70% then,
- **o/p power = 117.075kwh**

AIM:

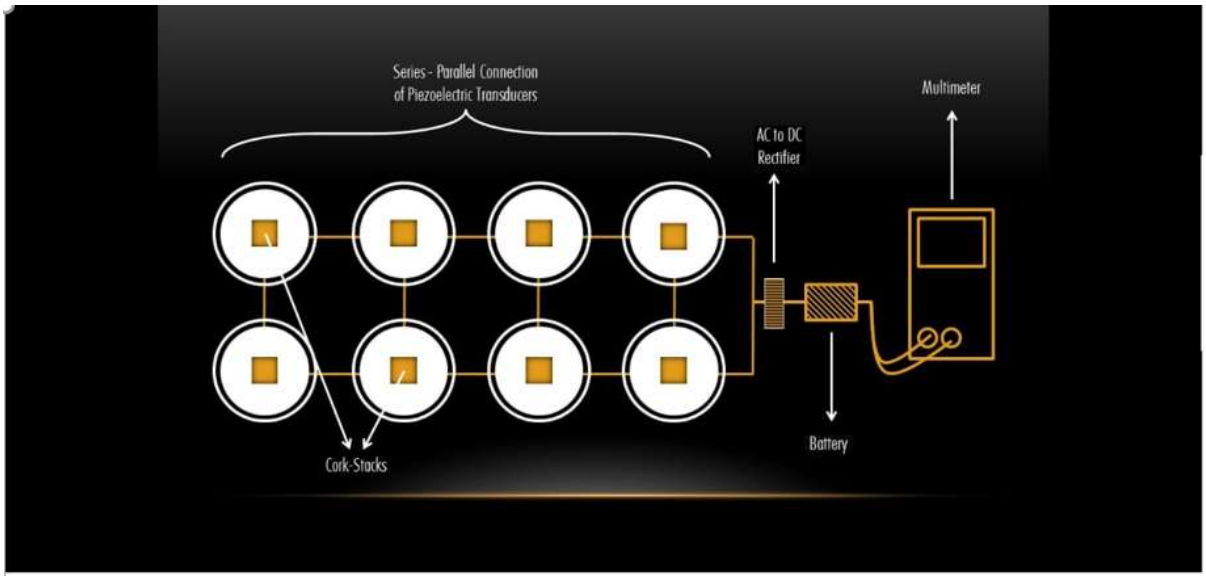
1. The aim of the current generation must be to provide the people of the world -born and unborn- a future devoid of power cuts and a sustainable environment

2. To build a project which can convert the Mechanical energy into electrical energy when someone walks or any car, bus, truck passes above it.

OBJECTIVE:

1. To find a way to minimize pollution while generating electricity
2. To create new way of evergreen energy.

BLOCK DIAGRAM:



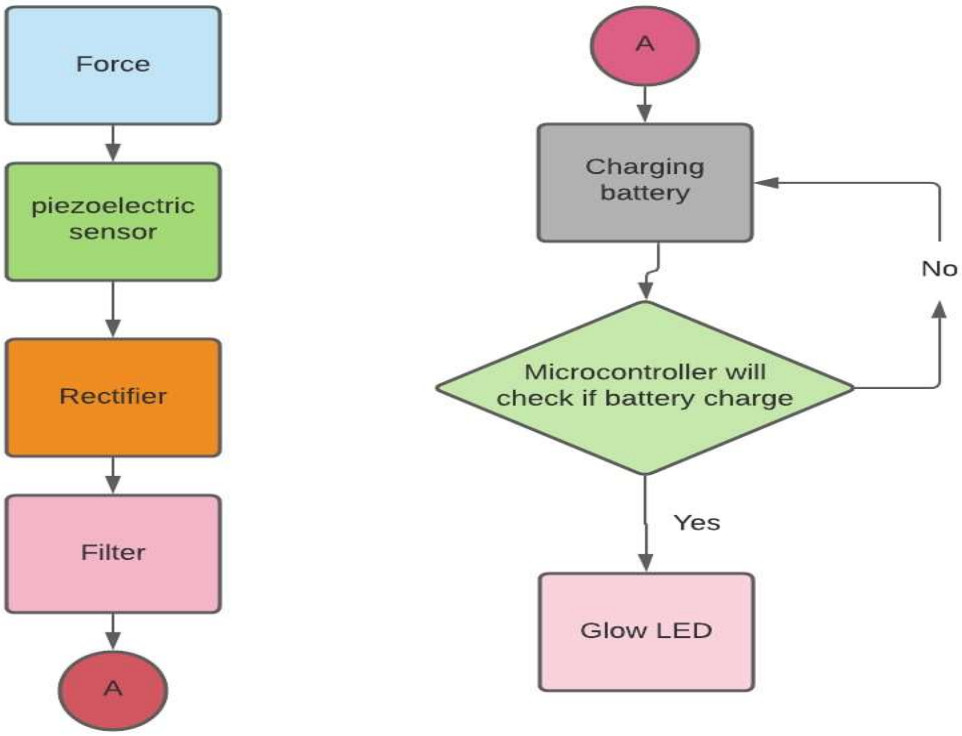
BLOCK DIAGRAM EXPLANATION:

1. When piezoelectric sensors are connected in series combination then output voltage is large but output current is low and when piezoelectric sensors are connected in parallel Combination then output current is large but the voltage is low.
2. We need a combination where output voltage as well as output current is high.
3. We have to do connection in such a way that it should match the required current and voltage.
4. So a combination of series and parallel connection of piezoelectric sensors is made.

5. The output of the piezoelectric sensor is AC and to convert this AC voltage to DC rectifier is used.
6. The output of the rectifier is fed to the batteries for charging.

TECHNICAL DETAILS: *(including hardware and software implementation along with flowchart)*

1. Piezoelectric Transducer
2. Conducting wires
3. AC to Dc rectifier circuit (consisting of suitable Diode, resister & capacitor)
4. Multimeter
5. Probes
6. Cork
7. Tile (Metal plates)
8. Hard Spring (between two tiles)
9. Battery
10. PIC18F2550



INNOVATIVENESS & USEFULLNESS:

1. Idea of conversion of energy of Human's weight to electricity is unique in its own way.
2. A tile increasing the blood flow of human being seems a legit joke. However, this is amusing surprise benefit of piezoelectric stones, minerals and gemstones that they can help restore proper bio-electric functions of body
3. This project is need of future. Highly useful in every manner. In crowdy areas, city malls it can help reduce a lot of cost by using self-weight of people in crowdy areas and malls to light up street lamp, traffic signal, mobile power banks etc.

CONCLUSION:

1. A resource of electricity is produced with mechanical energy i.e. Force as input and Electricity as output
2. This source in no matter harms environment and its implementation can be done all over world provided, Human's force will act upon it in any method (walking or any vehicle passing above it)

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