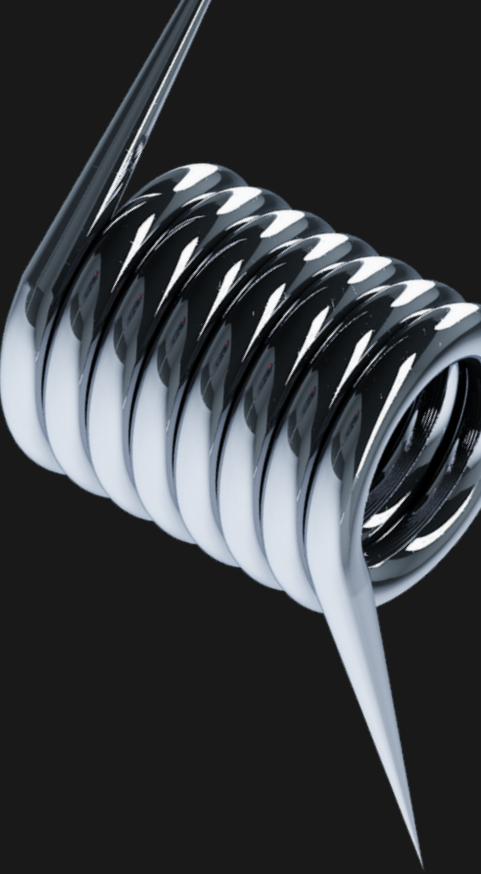


# Problem Statement



The need for finding renewable sources for energy generation has been growing ever since.

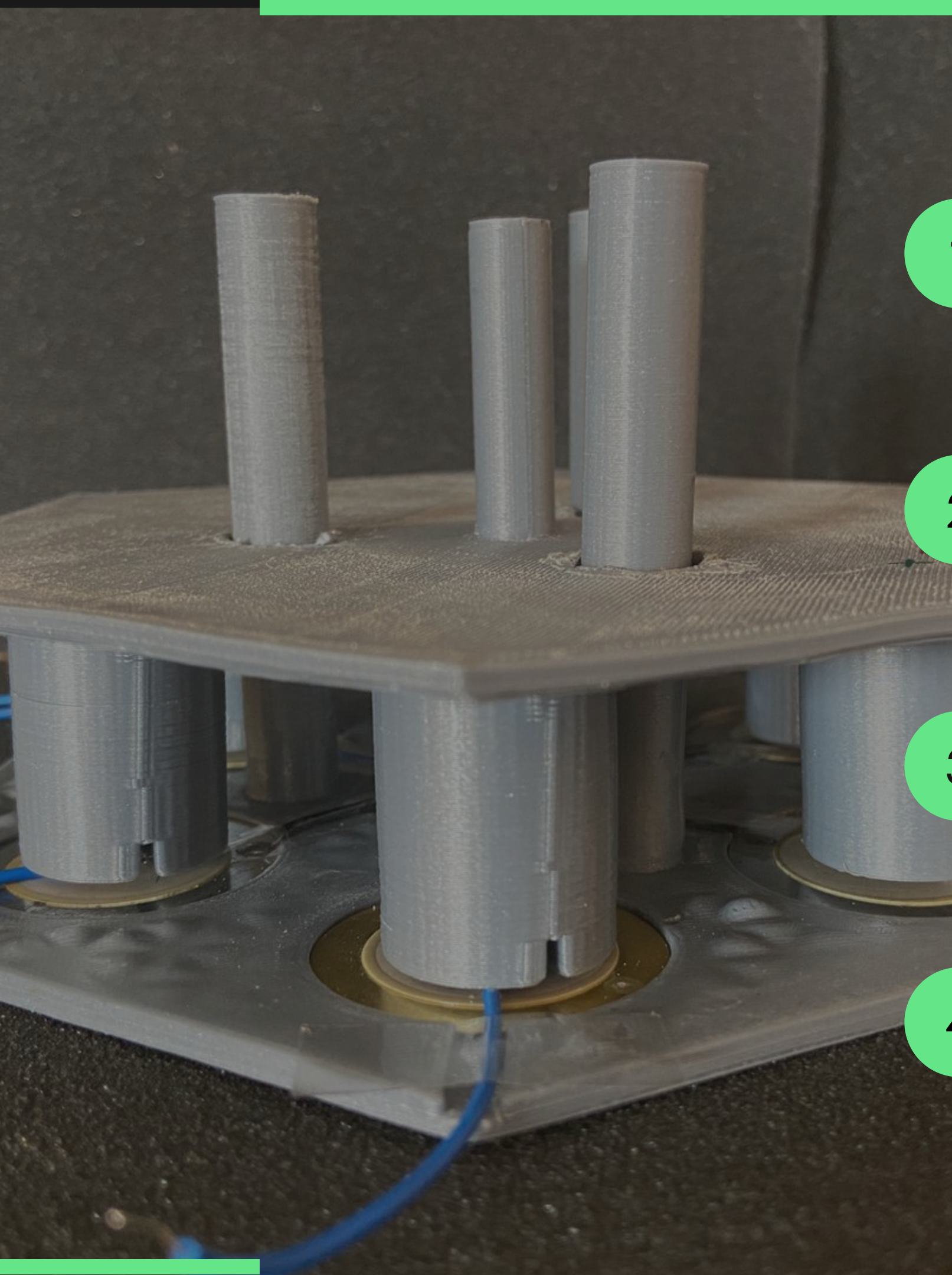
So we aim at addressing this problem by converting mechanical energy to electrical energy using piezo electric materials.



# Solution

- We intend to use footsteps as a source of energy.
- The energy is increased by connecting several modules in a particular fashion.
- This is an outcome of rectification, stabilisation and finally an appropriate storage.





## WORK FLOW

1

Idea Generation

2

Idea Selection

3

Seven Sub module  
integrated  
structure

4

Voltage peaks  
obtained

5

Rectification,  
Stabilisation

6

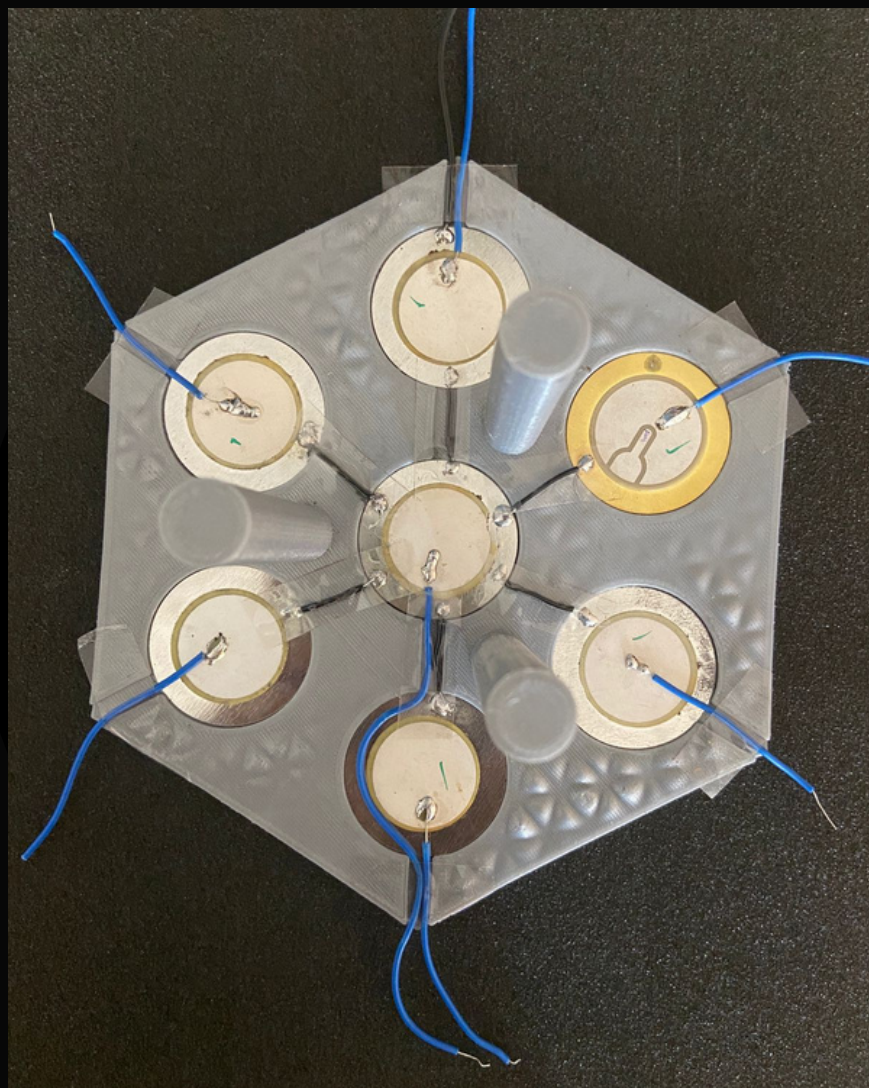
Energy  
generation

7

Storage and  
distribution



# PIEZOELECTRIC DISC STRUCTURE



The piezo disc has three terminals.

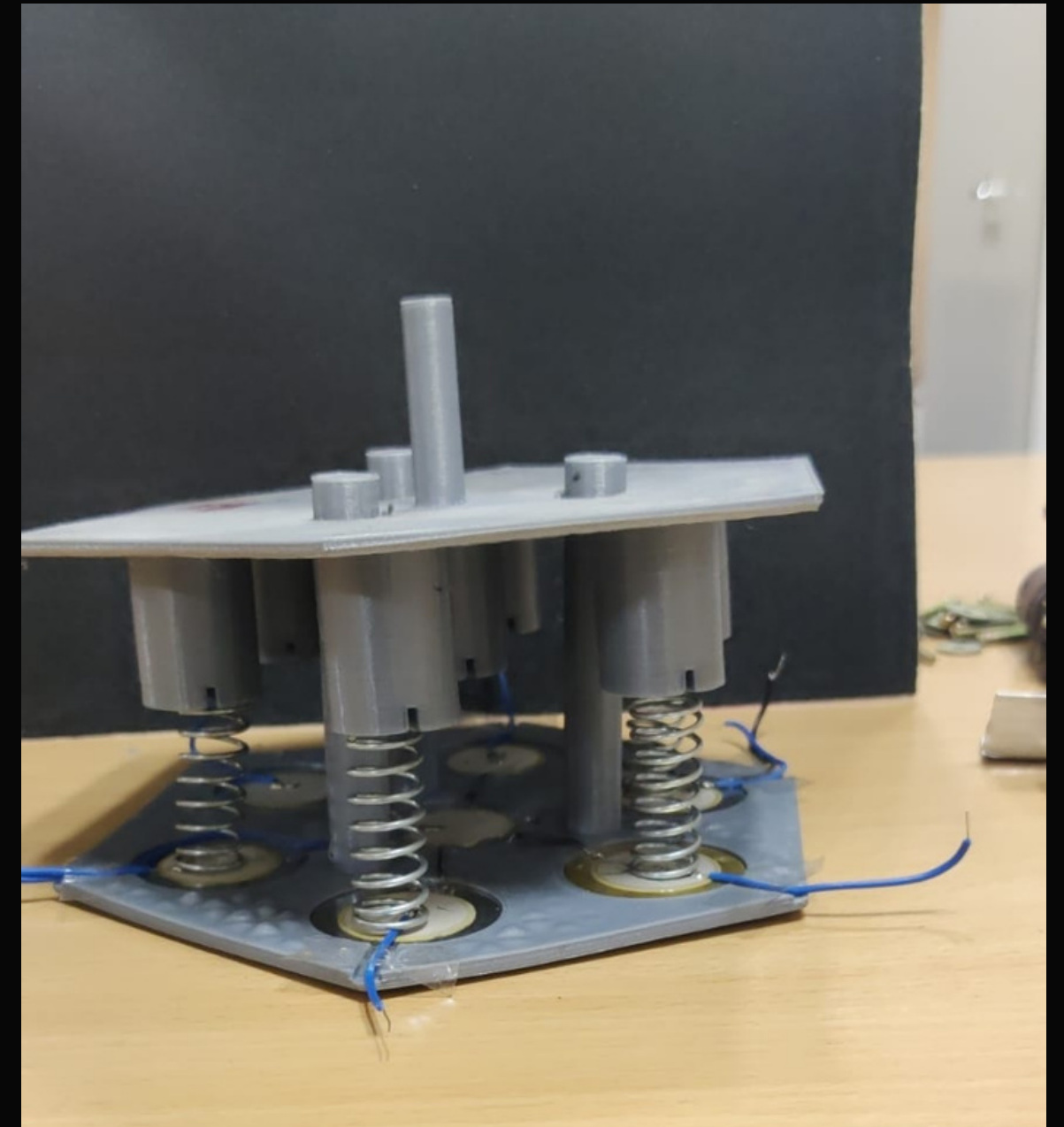
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We soldered the black wire to the negative terminal and red wire to the positive terminal.

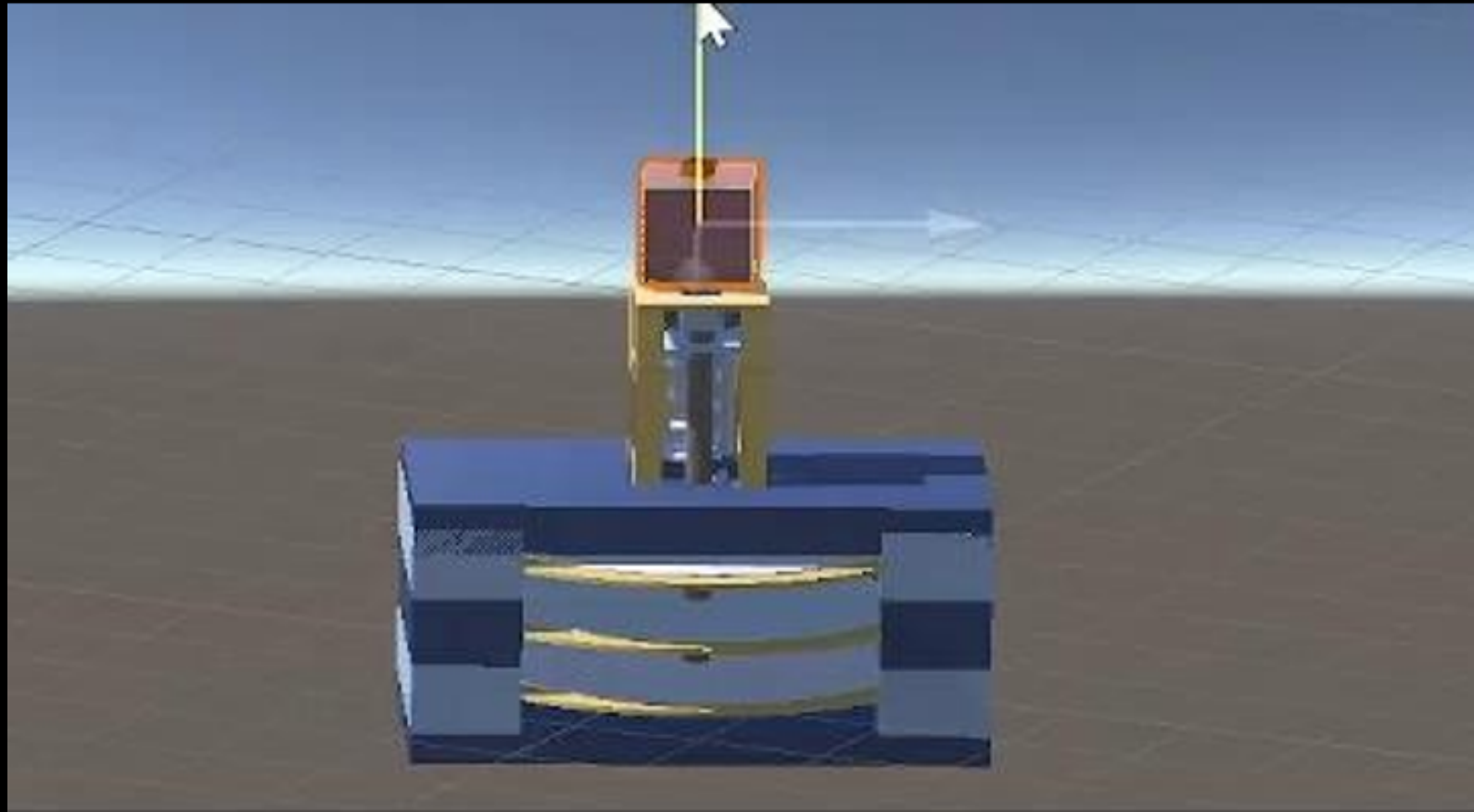
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# INNOVATION

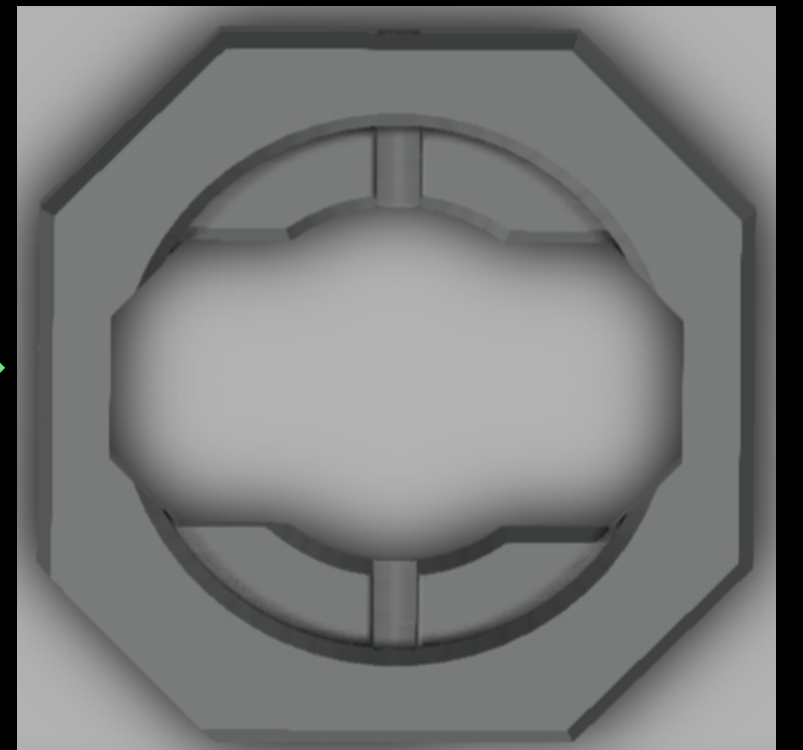
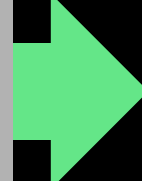
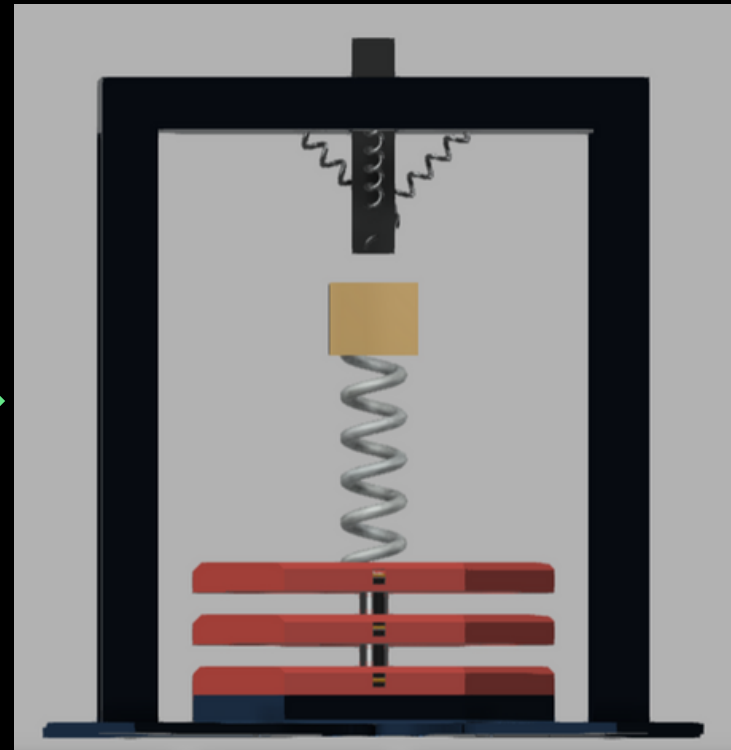
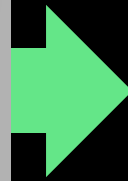
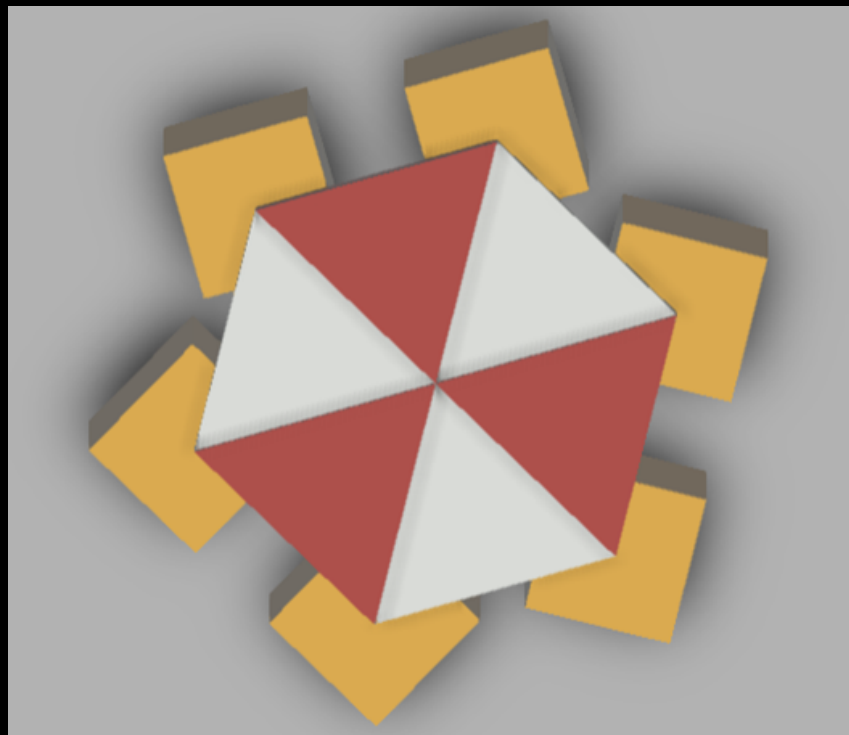
- The energy is generated even when there isn't a continuous flow of pressure i.e. the footsteps.
- It is ensured by a novel mechanism which is induced by a single footstep.
- A single footstep is enough to trigger the piezo to generate energy in continuous cycles.



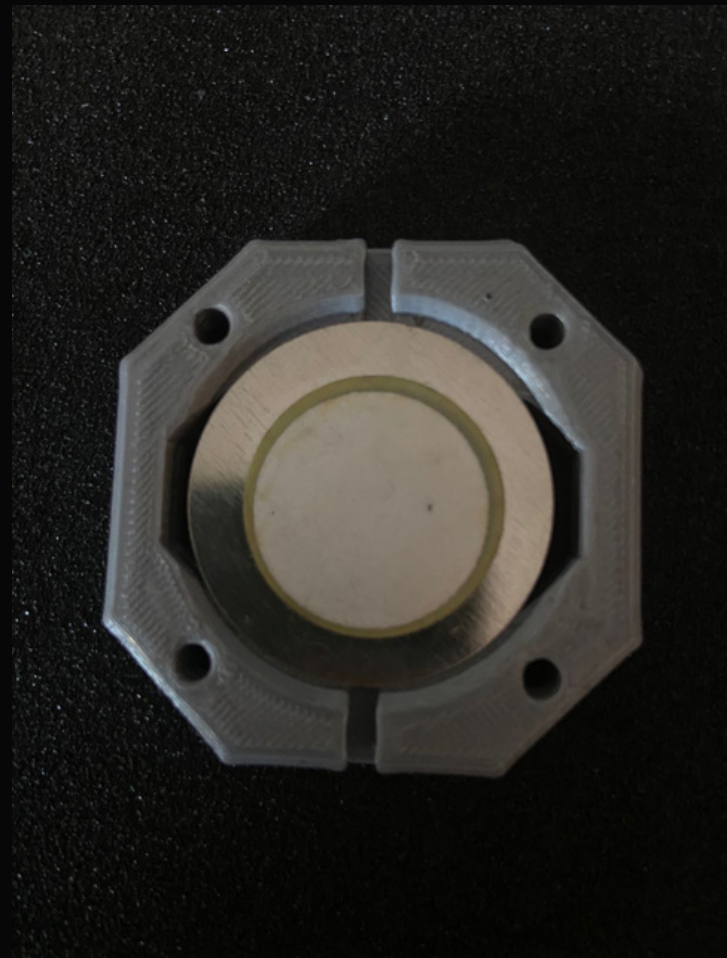




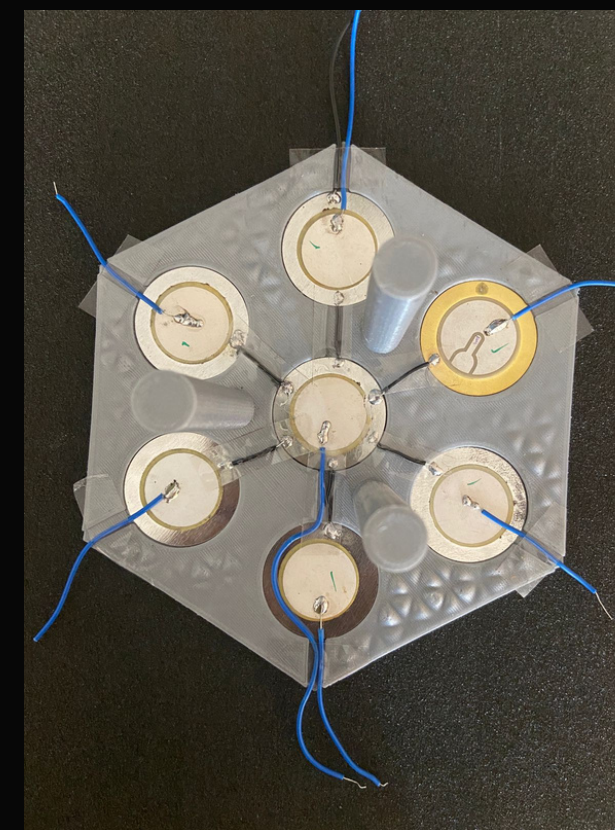
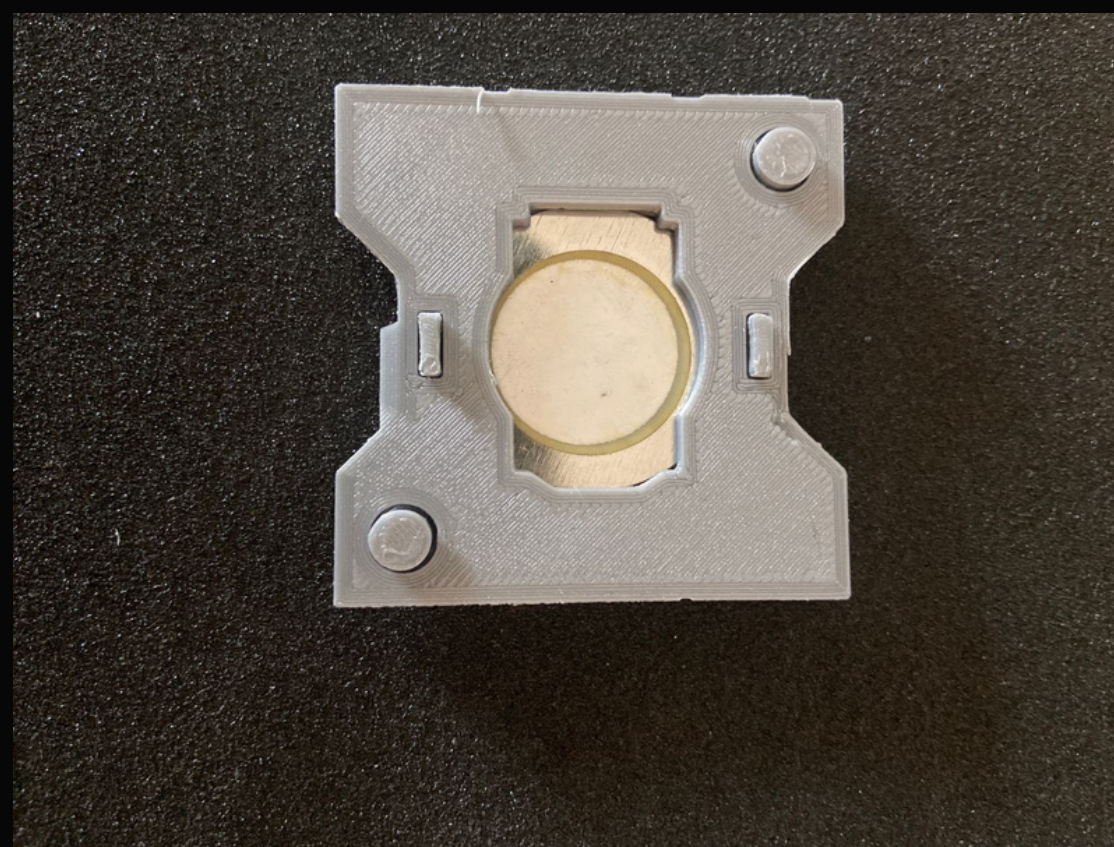
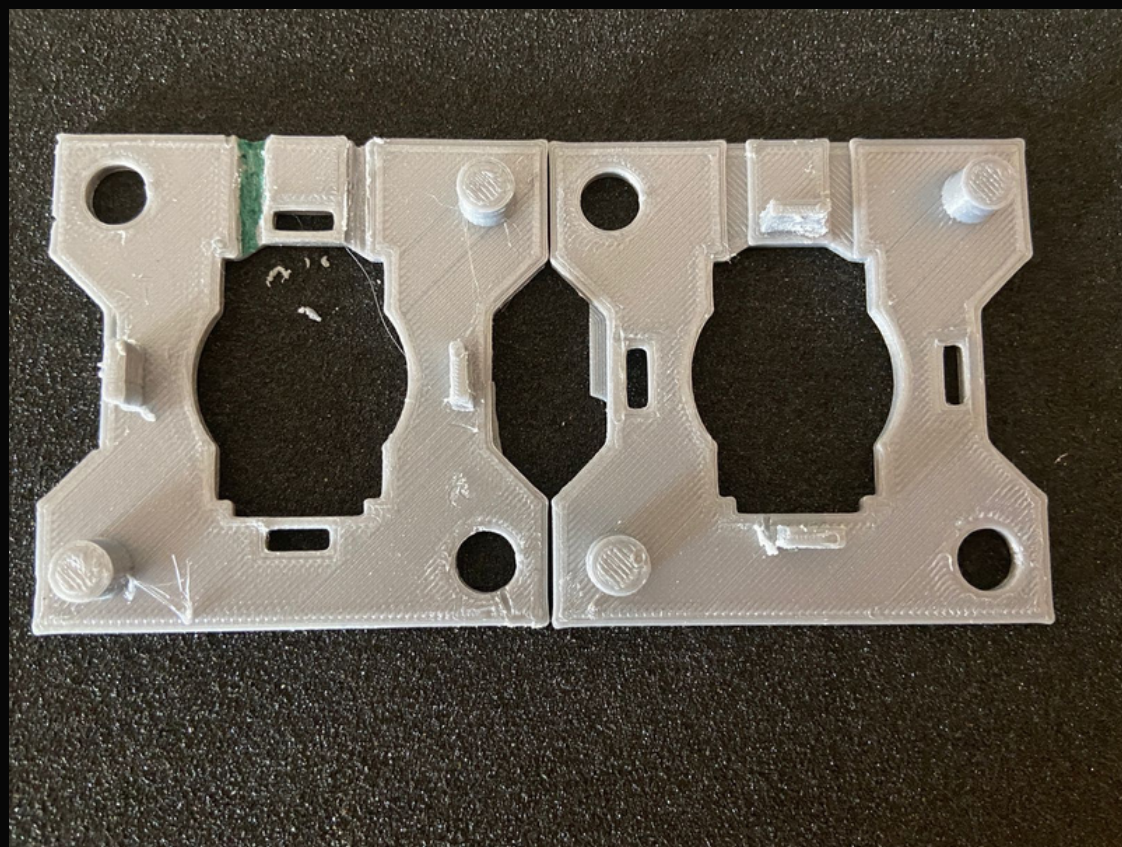
**Different versions  
of our ideation**



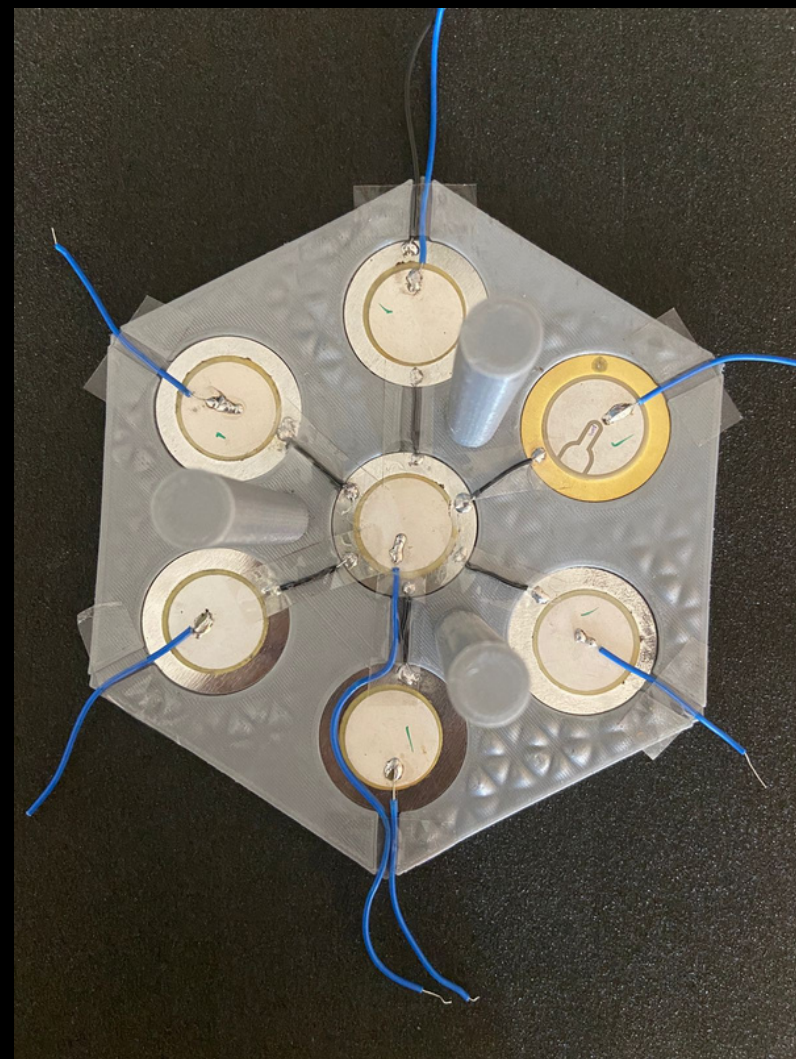




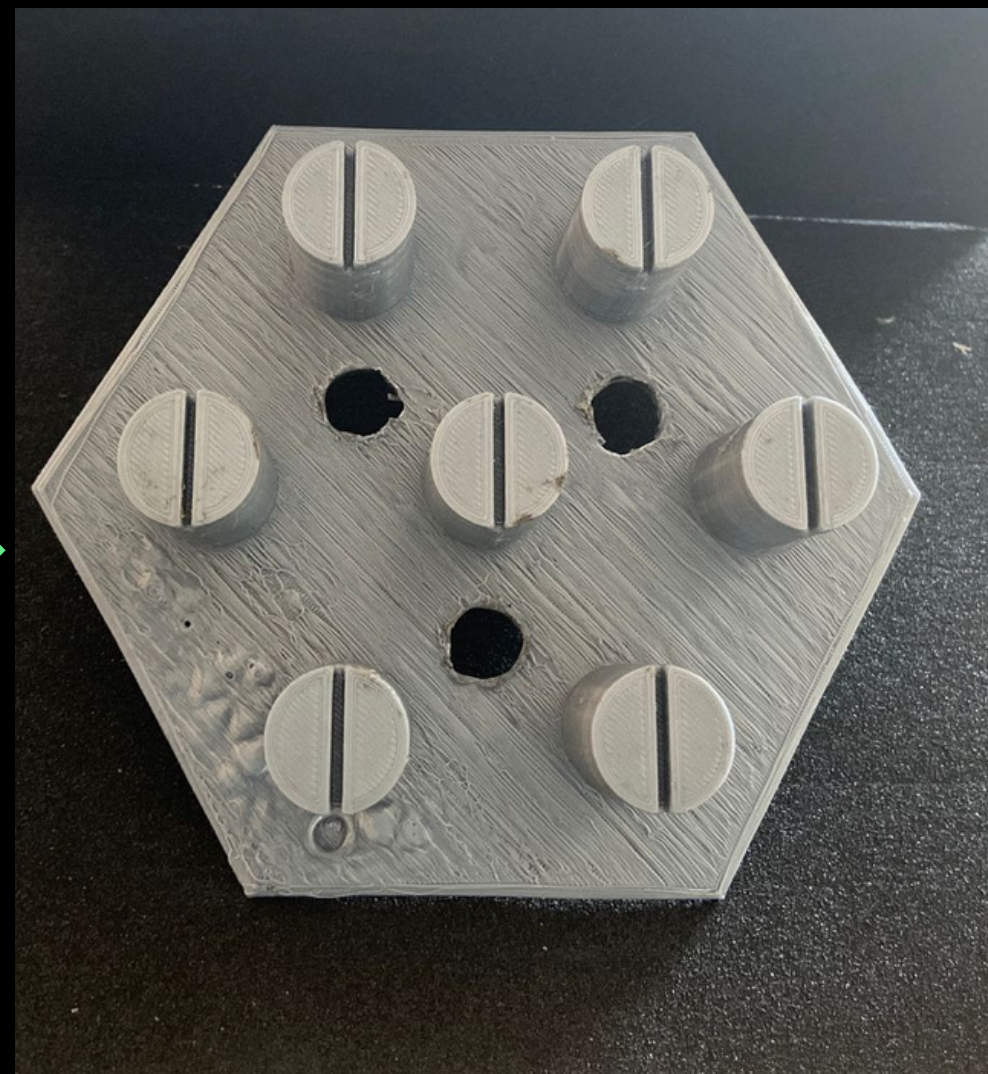
These are the different disc holding models we ideated about.



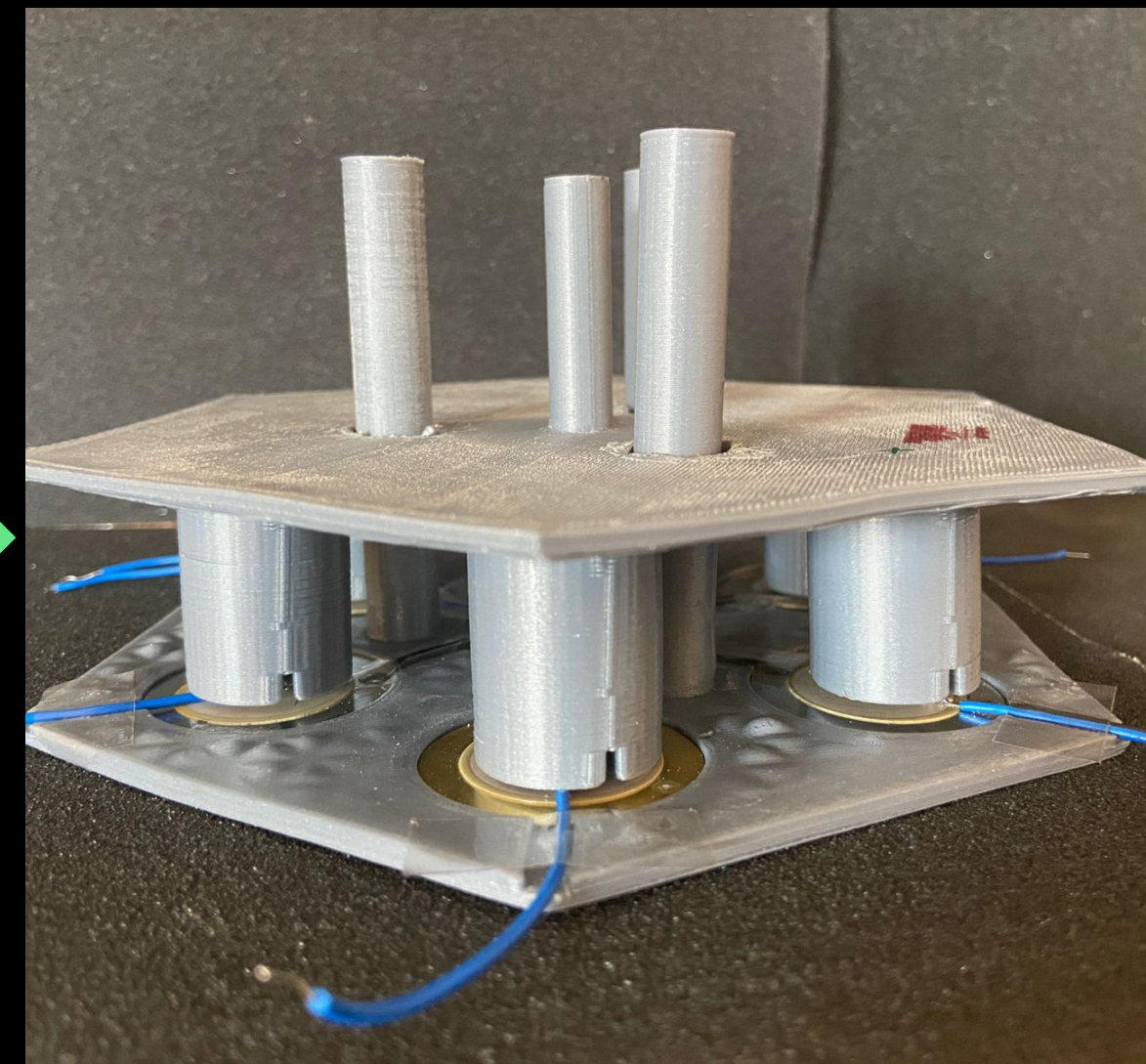




Bottom Structure



Top structure

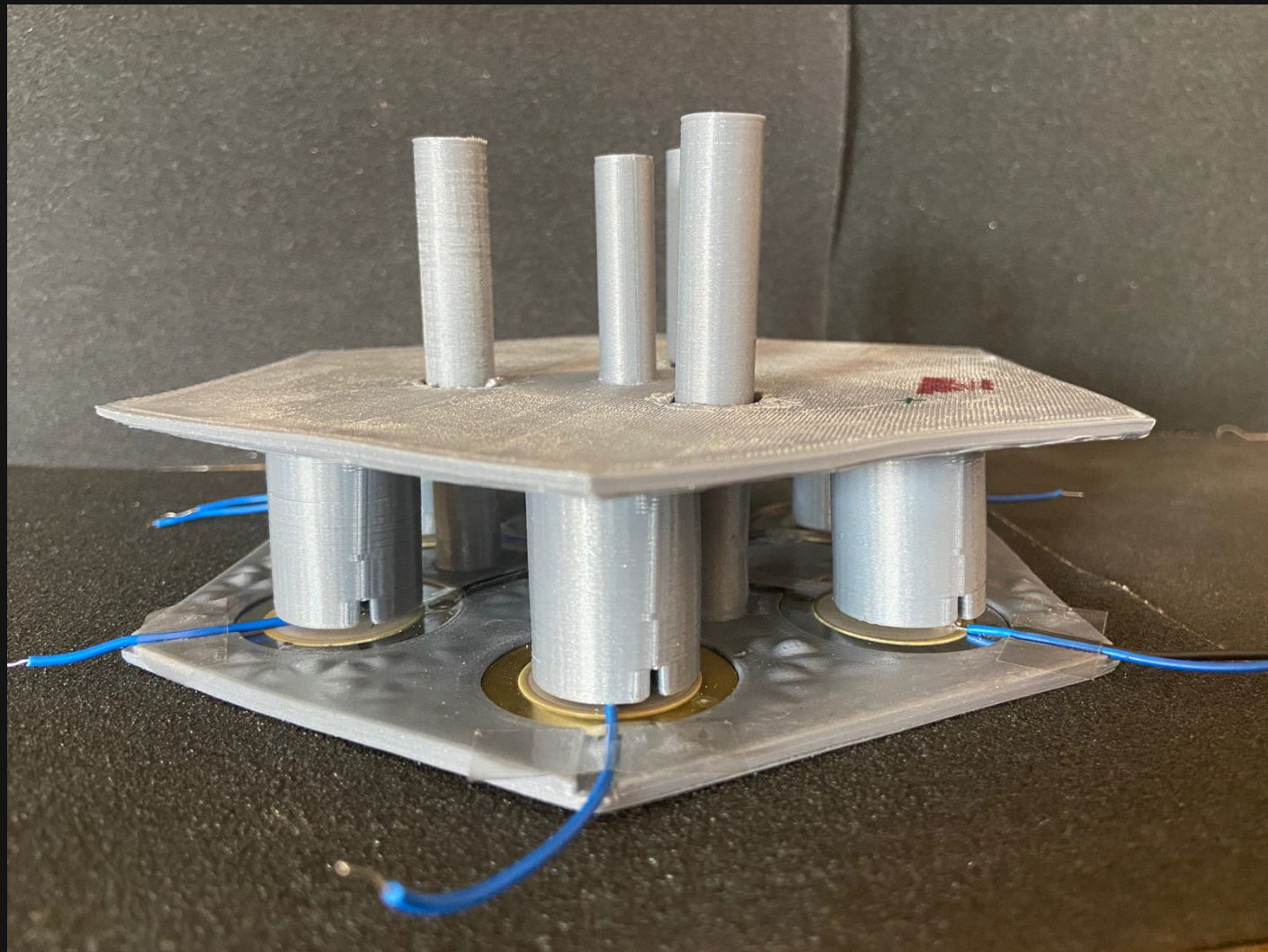


Side view

**The Final Prototype**



# DESCRIPTION OF PROTOTYPE



Our module is similar to a syringe where the pressure applied will deform the piezo.

The piezo disc will in turn generate electricity.

The output is increased multifold even when there is no external force by an internally devised mechanism.



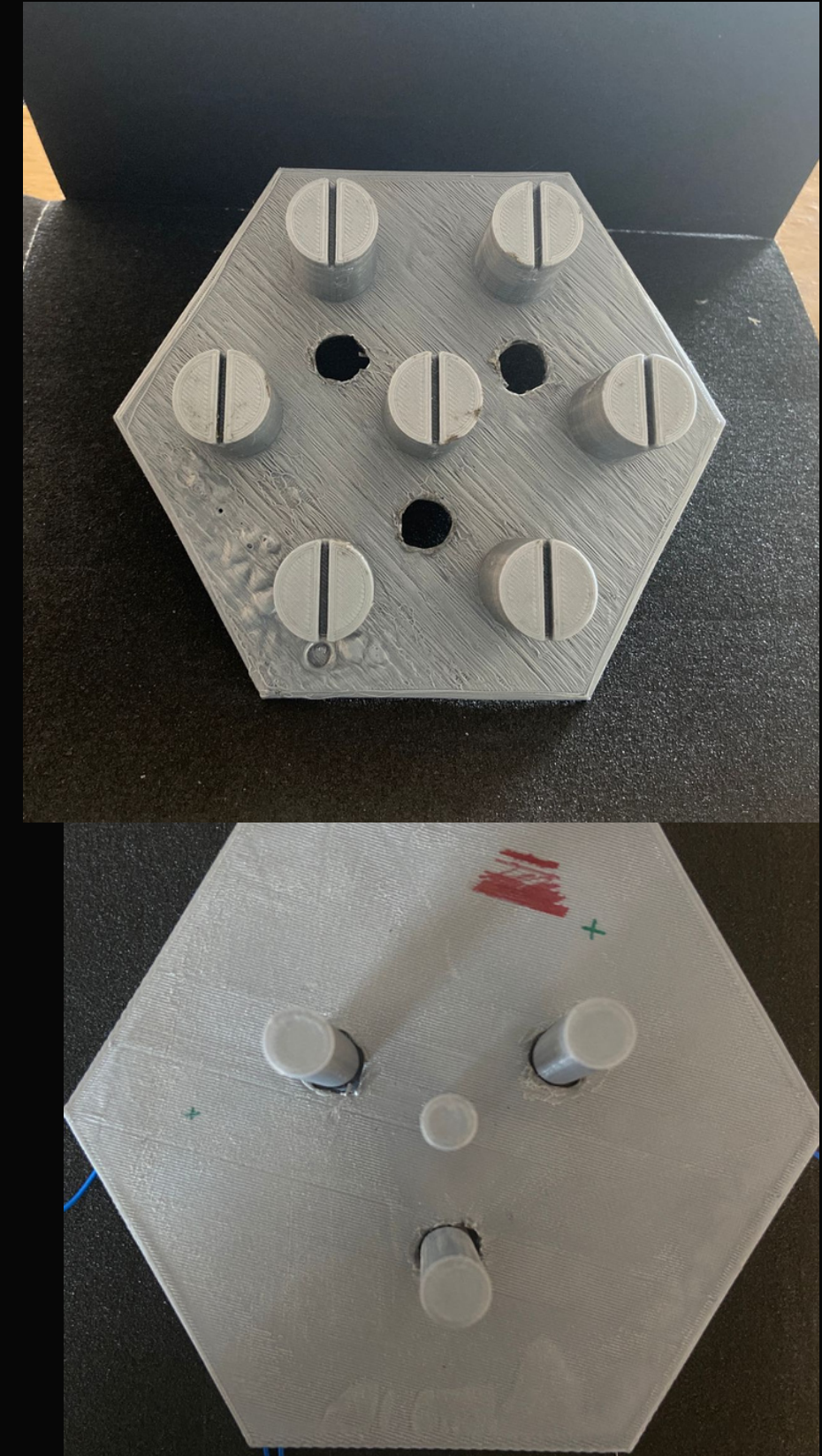
# OUTER MODULE

The external module has 7 discs in parallel to maximize the current and thus energy.

The whole model works in a way that as we apply a force, all the 7 sub-modules work individually but will produce energy collectively.

This will produce energy with much ease and efficiency.

It is intended to store this energy using a suitable storage mechanism.





# SWOT Analysis

**S**

## STRENGTHS

Imitation of multiple footsteps by a single step via a novel mechanism generating more energy.

**W**

## WEAKNESSES

Energy generation is subject to footsteps which may vary.

**O**

## OPPORTUNITIES

This may be a groundbreaking innovation as it converts the not so productive footsteps to something efficient and productive.

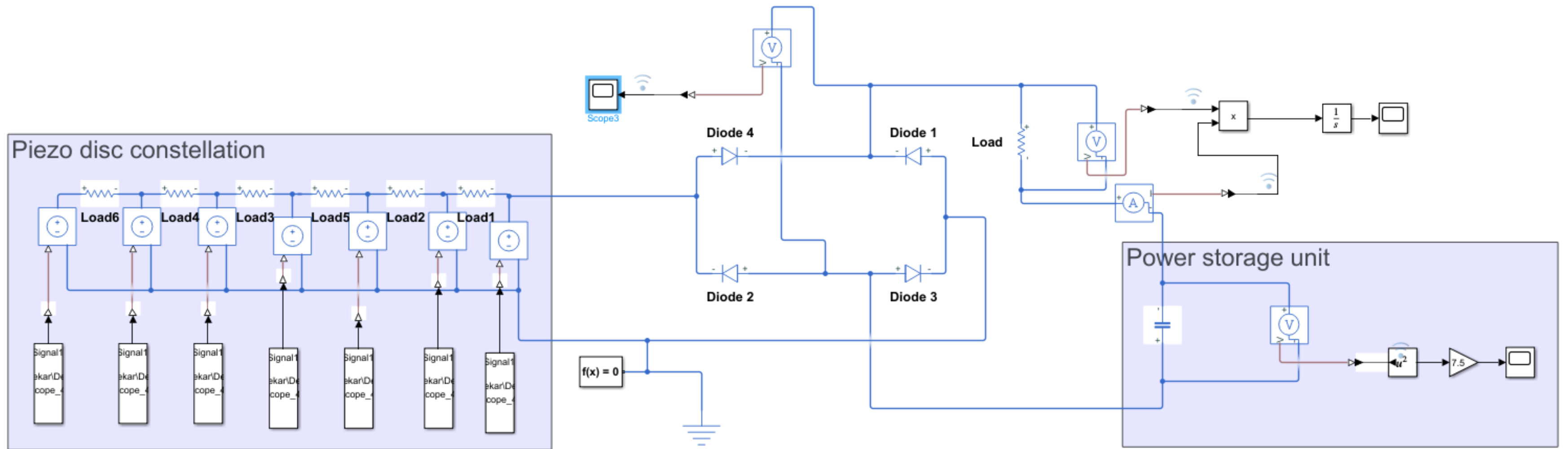
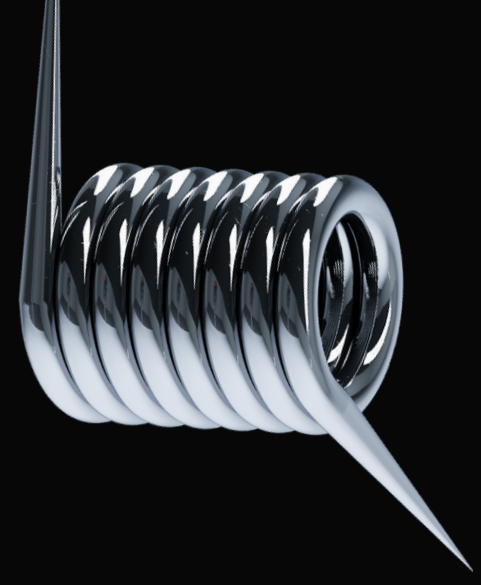
**T**

## THREATS

Our module may not receive immediate attention because of other alternatives like solar panels.

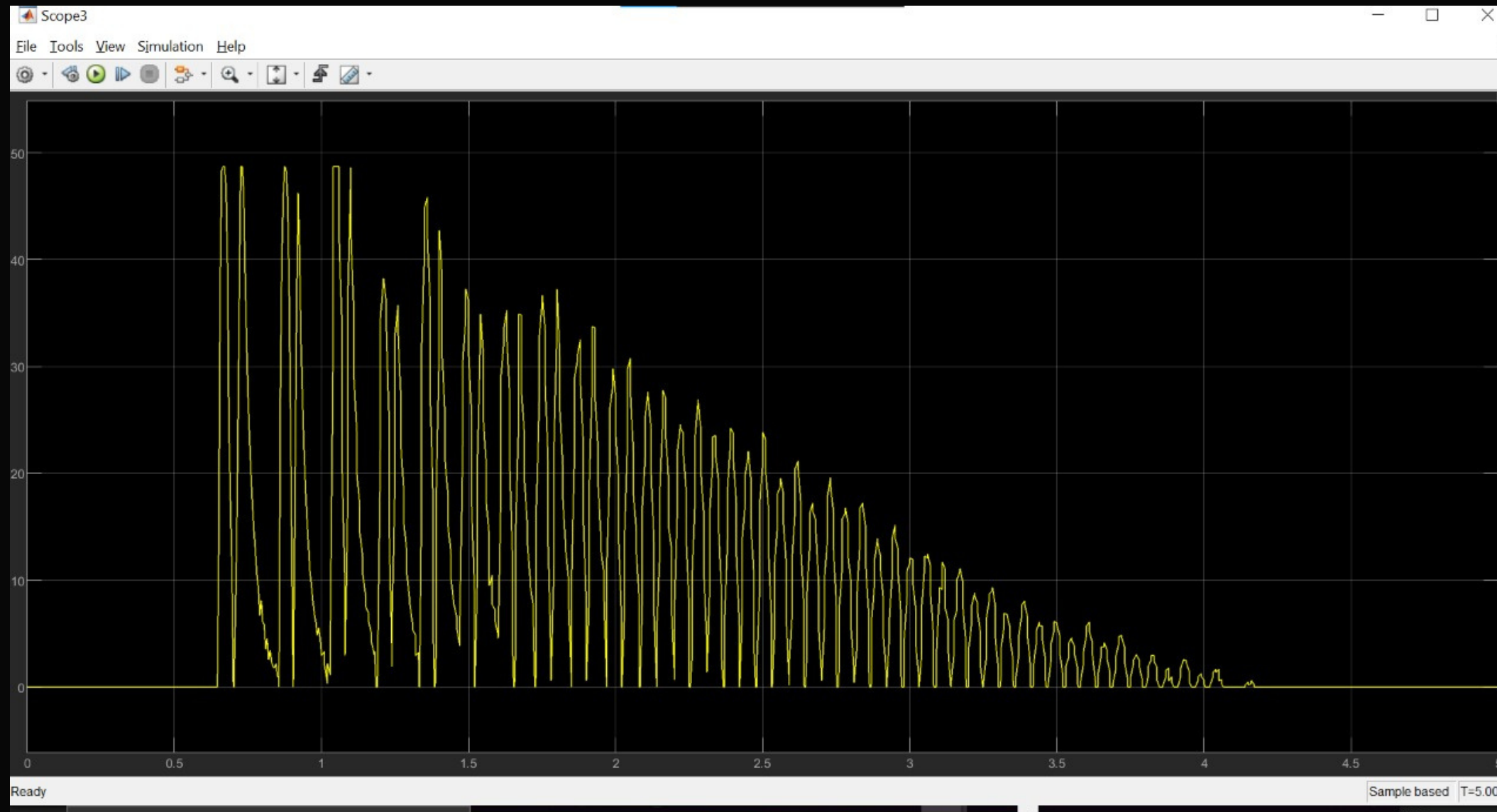


Depiction of circuit diagram of the entire module with 7 discs in parallel.





# Virtual simulation of the circuit

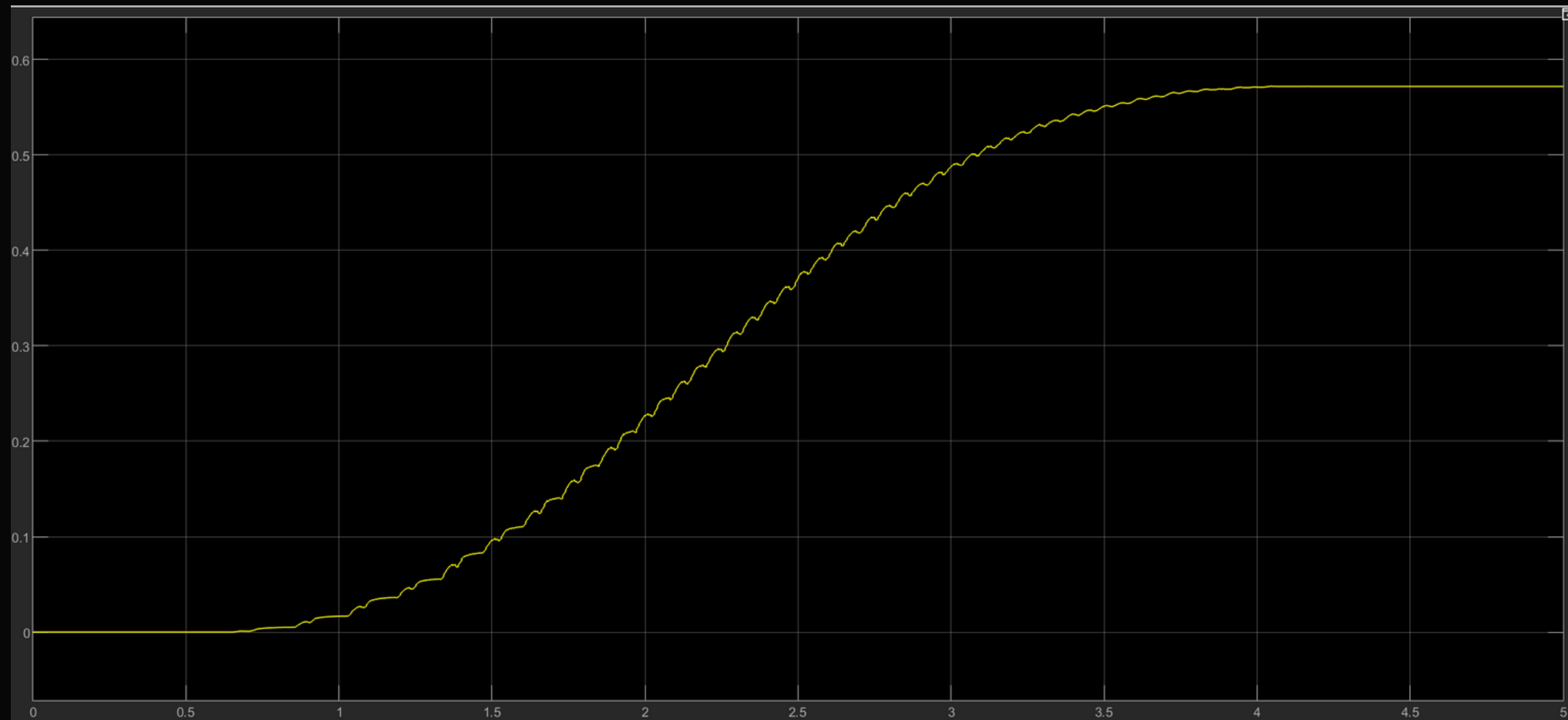
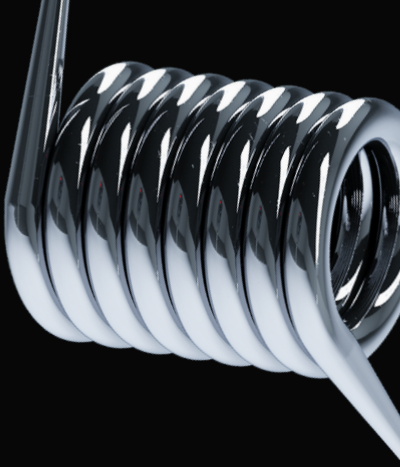


These are the rectified voltage spikes obtained from Full Bridge Rectifier.

The voltage spikes are around 45 volts after rectification.

This is a result of a single footstep activating 7 discs

# ENERGY ANALYSIS



The energy generated per step per module is 0.5695J.

The integral of current with time gives charge which is about 4.121 Coulombs.

This energy is stored and distributed.



# CALCULATIONS:

Energy per step per module:

0.5695 Joules

Number of discs activated  
per footstep:

7

Number of footsteps per day:

7.6 million

Total energy generated per day:

$4.328 \times 10^6$  Joules

