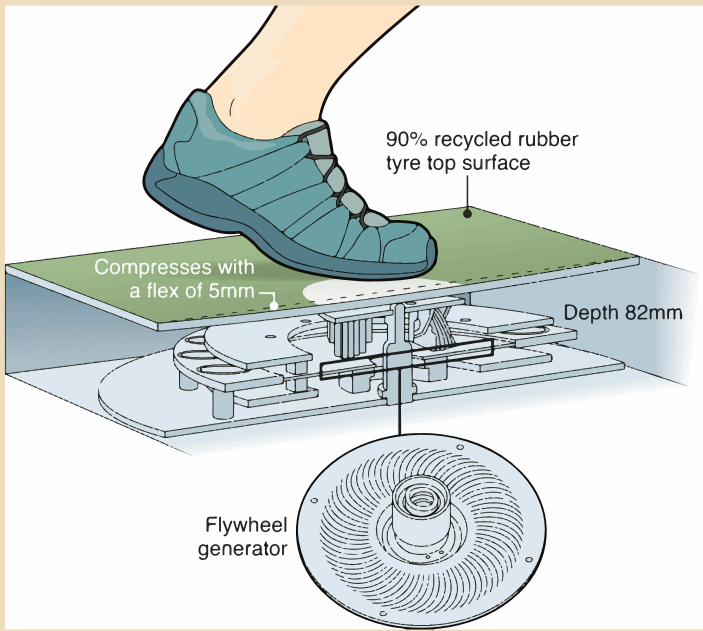


POWERGYM

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MECHANISM



Piezoelectricity

* Piezoelectricity is the electric charge that accumulates in certain solid materials [1] in response to applied mechanical stress. Materials which exhibit such properties are piezoelectric materials. Research is ongoing in this field and gradually various kinds of such materials are being manufactured. Sodium bismuth titanate, polyvinyl fluoride etc are some examples. Recently Some researchers in china have been able to manufacture organic piezoelectric material.

- * If the treadmill that is used is composed of such a substance, then we can harness the vibrations of human footsteps while running.
- * Even the floors where regular physical exercises are performed can be made of such materials.
- * Walkways, indoor basketball courts etc can be constructed out of piezoelectric tiles to utilize those energies.

 All the mechanisms mentioned are implementable. Moreover, the scope of such a system is quite broad and can be expanded to even situations outside gymnasiums or health centres.

Piezoelectric technology is capable of producing **7kWh/day** across an area of about 2400 sq ft from foot traffic.
(Source: Rutgers University, rei.rutgers.edu)
or alternately about **100µW/sqcm** (Source: iee-explore.ieee.org)

The amount of energy generated depends upon the weight of the person, maximum deflection, and type of movement. This kinetic energy is converted into electricity. Piezoelectric clothes can be also used in the gym. Its cost is about 3 times more than conventional flooring tiles.

 A cycle generator can produce **100 watts/hr** on an average. So, in one month one person cycling can save about Tk 120. The energy produced here is also not affecting the environment adversely. The storage facility of this system ensures that we are able to utilise the produced energy properly and that it is not wasted.

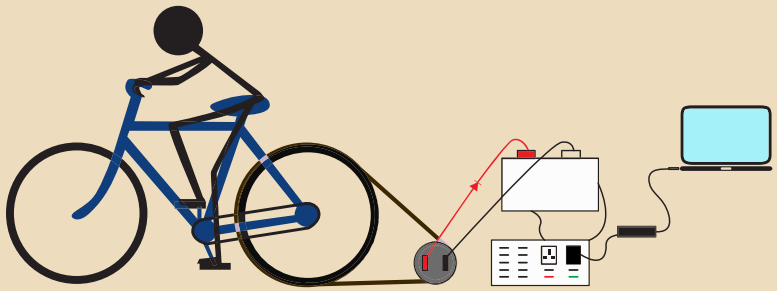
In the days to come, we will have cheaper alternatives to implement such a plan and we will have more people coming in to these gymnasiums. Our work is mainly focusing on gyms or fields that are easily accessible and are low maintenance.



FEASIBILITY

The construction of this PowerGym seems complex, and slightly overambitious at first. But it is possible to make it. We are already using turbine generator in different sectors. So, why should not we use it in the gym? Piezoelectric materials can also be introduced gradually. We can keep ourselves fit and at the same time, getting electricity and saving money will be an incentive for work out as well.

CONCLUSION



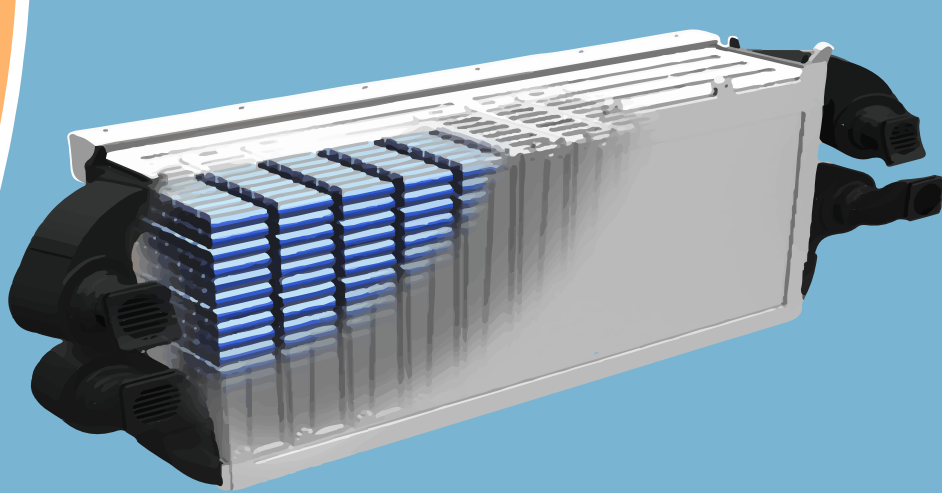
Mechanical

* Linear mechanical motion of different gym equipments (Pull down machine, Chest press machine, leg adduction machine etc) are converted to rotational motion by crankshaft.

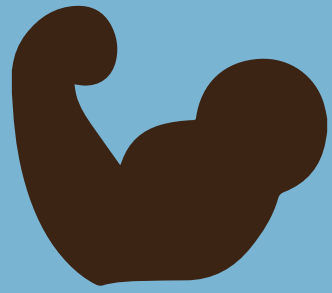
- * Here, the system is made such that the speed of rotation will depend upon the magnitude of mass utilized.
- * Turbine takes the rotating energy. Rotational energy is also generated from cycle/ treadmill. This in turn rotates the rotor of the generator.
- * Generator is used to convert mechanical energy to electrical energy (DC). This is stored in numerous battery packs co-alesced together

* Then a boost converter will step up the voltage to store the DC power in batteries (A boost converter is a DC to DC converter with a higher output voltage than the source voltage).

* Lithium or Lead batteries are used to store DC electric energy.



Our world is getting over populated and this is causing an energy crisis. Gradually the crisis will deepen and as such it will become necessary to harvest energy from different sources.



Every single human is capable of being a contributor in energy production. This can, and should be utilized as a source of usable energy

As it doesn't have any adverse effect on the environment, this mode of energy production is sustainable and is suitable for implementation.

The idea that one's leisure activity can actually contribute to the production of energy will incentivize more people to undertake sports and other fitness schemes in order to stay fit.

IMPACT