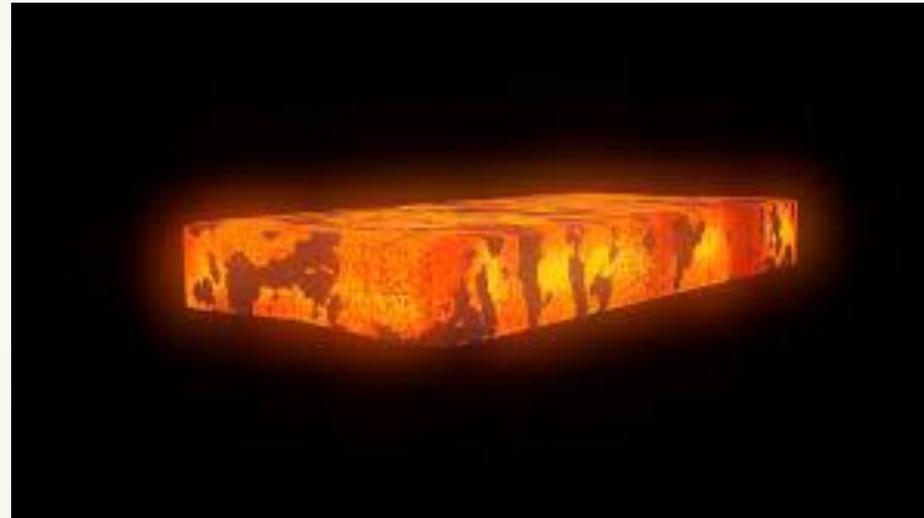


Resource Conservation & Utilisation

“Generating Electricity from Unused and Lost Heat ”



By : **Athul Anoop**

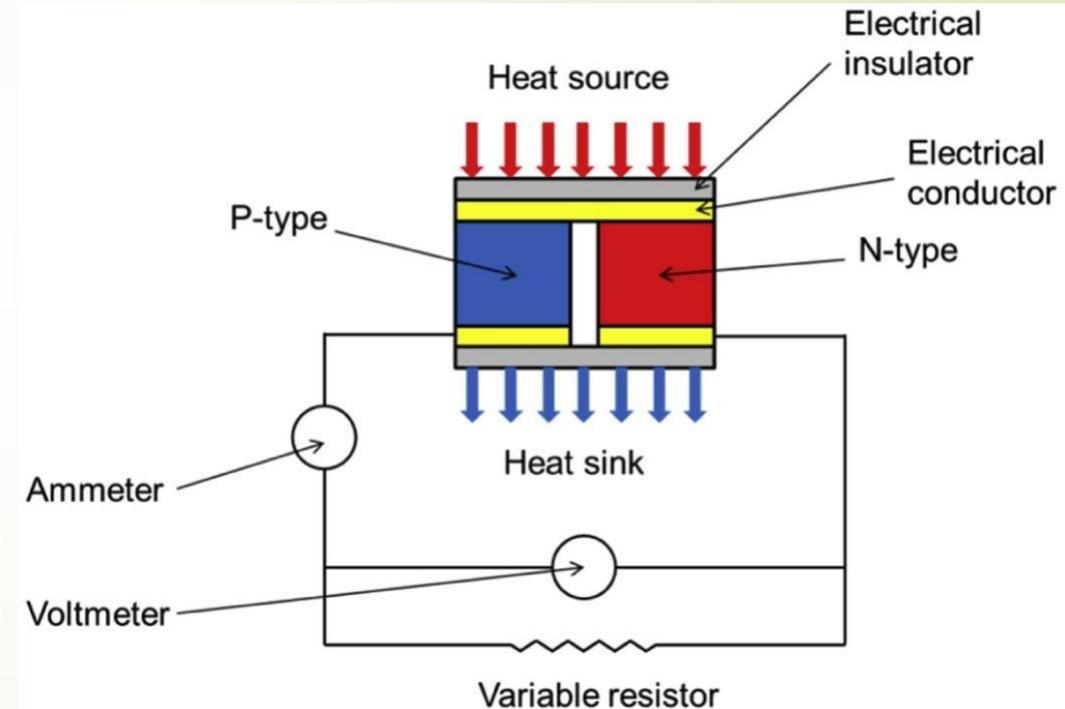
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School : Mahindra World School

Thermoelectric Generators (TEGs)

Thermoelectric generators, generally known as TEGs are capable of generating electrical energy from heat energy.

TEGs generate electricity based on temperature difference.





Proposed prototype before mentoring

At first the idea was to use heat from random places to generate electricity .

The prototype would use heat from vehicles , primarily to generate electricity .

The prototype was too broad on its application .

Finalised prototype after mentoring

The prototype now uses waste heat energy from air exhausts(Industrial and common A/C units,) and has a higher level of efficiency.

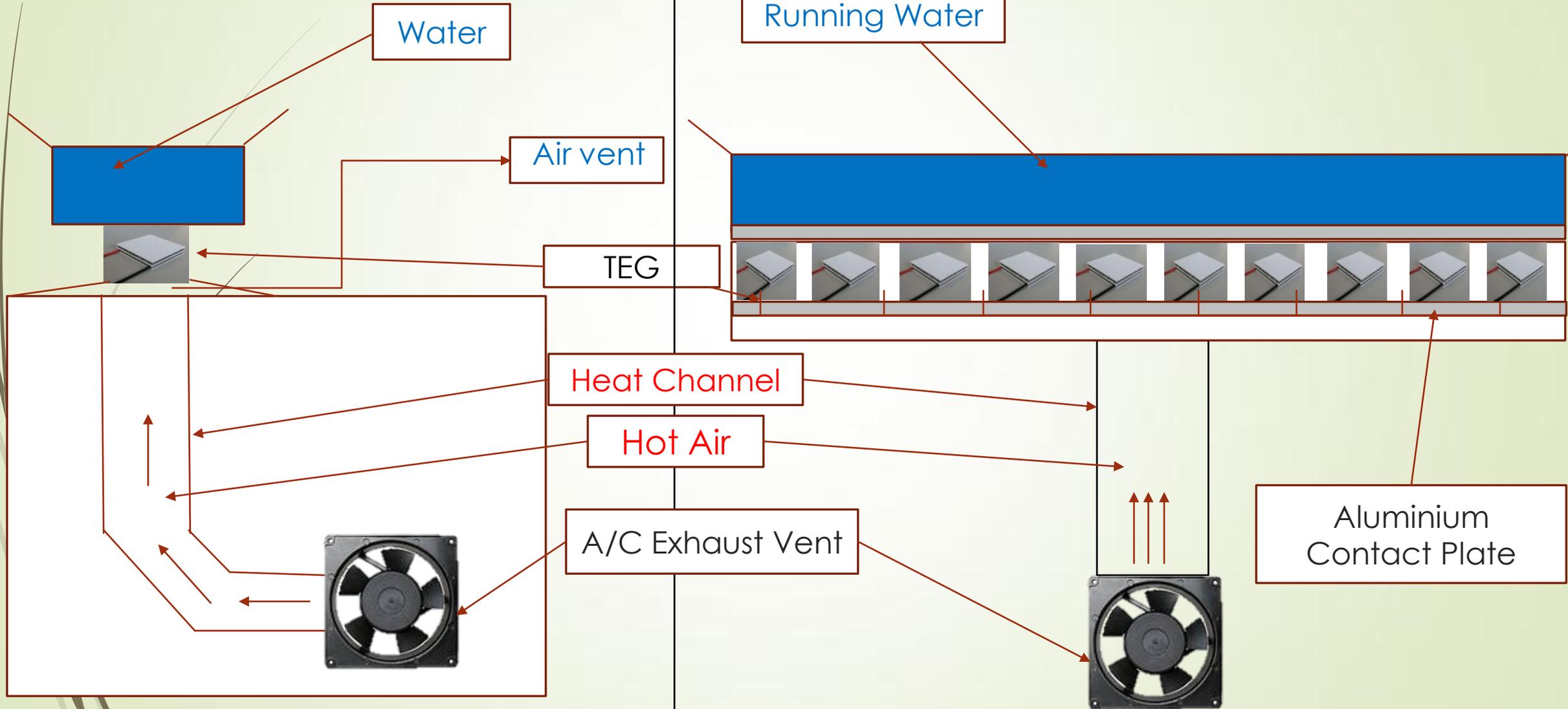
It also will be able to harness excess heat from heavy industries(E.g. Iron and steel).

The current prototype uses hot air vented out from A/C exhausts.

It comprises of a cooling water can on one side and a channel through which hot air reaches the TEG on the other.

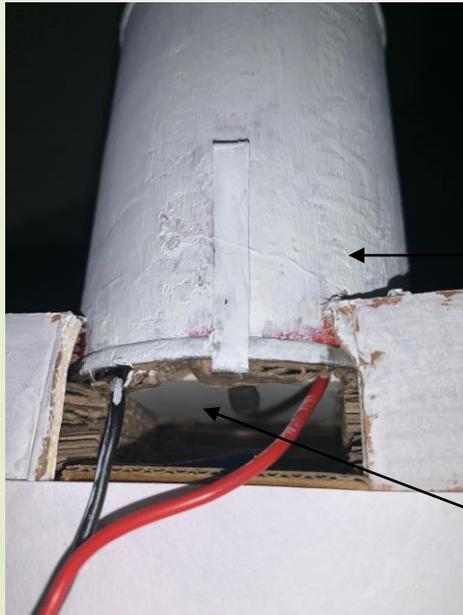
Prototype

Actual Unit



How the prototype utilizes heat from air conditioner exhaust air?

- ▶ The hair dryer is used to simulate exhaust air from A/C.
- ▶ When the hair dryer is turned on, hot air travels through the funnel and reaches the TEG. This heats up the TEG .
- ▶ Water (At room temperature or chilled) is kept in the container placed right above the TEG in contact with the TEG. This results in heat moving from the TEG towards the water.
- ▶ The movement of heat from the TEG to the cool water in the tank results in the generation of electricity. This is the result of movement of electrons from heated side to the cooler side.



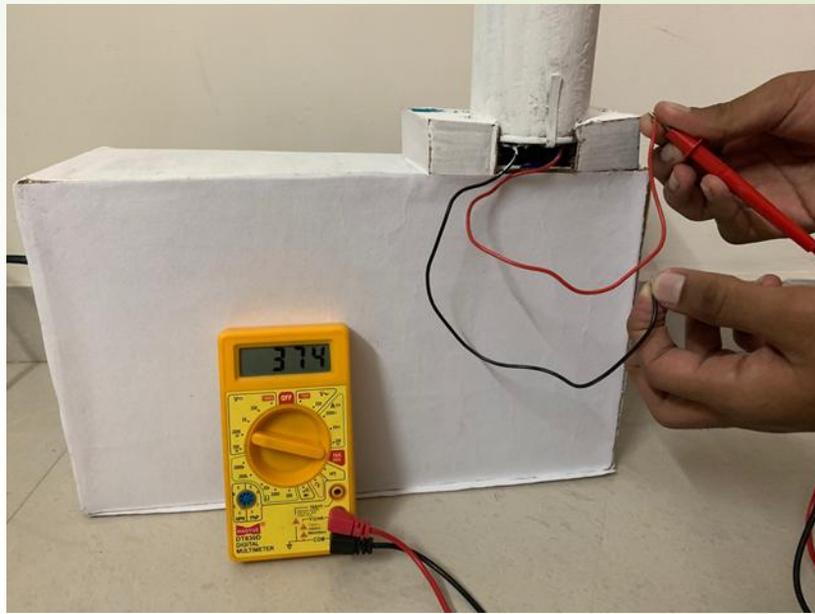
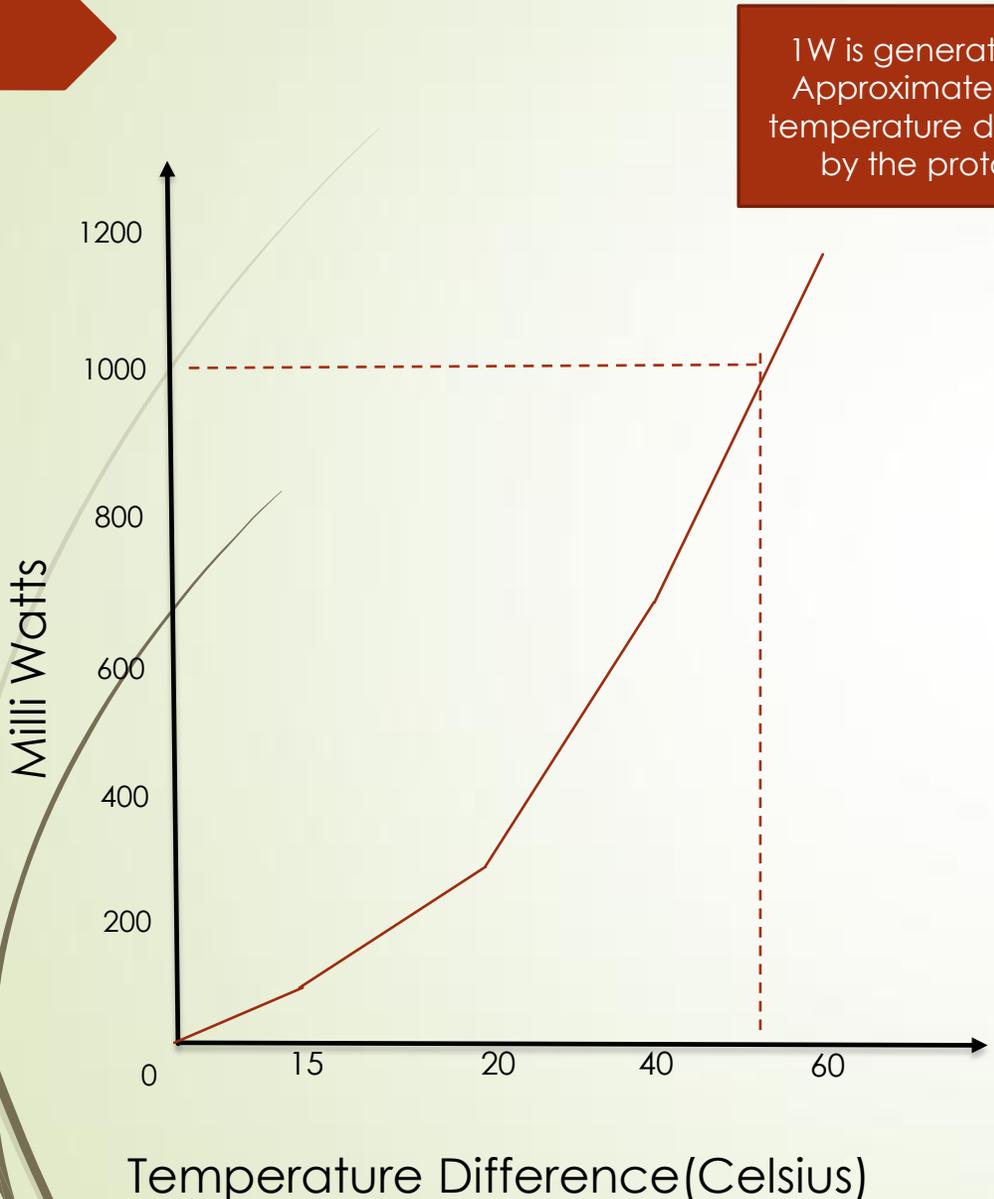
Water Can

Thermoelectric Generator

Hair Dryer

Funnel

Energy Produced in Accordance with Temperature Difference



Heat (Celsius)	Cold (Celsius)	Temperature Difference (Celsius)	Energy Production (Voltage)	Energy Produced (Ampere)
40	25	15	0.30	73MA
45	25	20	0.97	225MA
65	25	40	1.80	368MA
85	25	60	2.40	469MA

Cost of making for **Prototype**

Sl.No	No.Of	Components	Cost
1.	1	TEG	Rs.300
2.	2	Cardboard	Rs.30
3.	1	Metal Can	Rs.25

Total = Rs. 355

Cost of making for **Planned Unit**

Sl.No	No.Of	Components	Cost (Approx Value)
1.	10	TEG	Rs.300 x 10 = Rs.3000
2.	1	Ceramic Case	Rs.1000
3.	1	Ceramic/ Clay pipe(Hard)	Rs.400
4.	1	Metal Tank	Rs.100
5.	1m	Aluminium Sheet	Rs.60

Total = Rs. 4560

Application of the module

In hotels : Hotels use A/C continuously ,i.e. all day . Hence a large amount of heat is released into the atmosphere from exhaust vents . This heat can be used by thermoelectric generators to generate electricity. The TEG can use running water in order to cool one of its sides. This will ensure that the water on the cool side of the module remains cool. Since water is used all day at hotels the system would remain cooled.

In heavy industries(Iron and steel) : In industries similar to iron and steel very huge amounts of heat is used to melt iron ore. This heat is often wasted. The TEG module will be able to generate a lot of electricity from the excess heat vented out from the blast furnaces of iron and steel industries.



Hot Air Exhaust Vent



Blast Furnace