

GENERATING ELECTRICITY WITH WINDMILL ON HIGHWAYS

SBOA SCHOOL & JUNIOR
COLLEGE
CHENNAI

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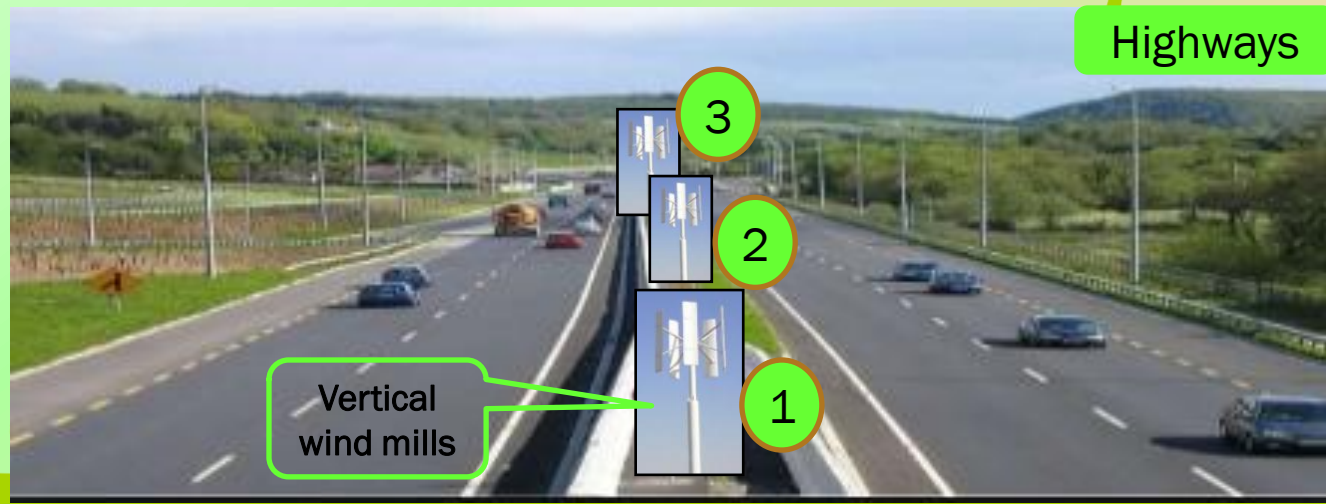
SYNOPSIS

- Introduction
- Working principle
- Tryout & Working model details
- Advantages & Challenges
- Conclusion



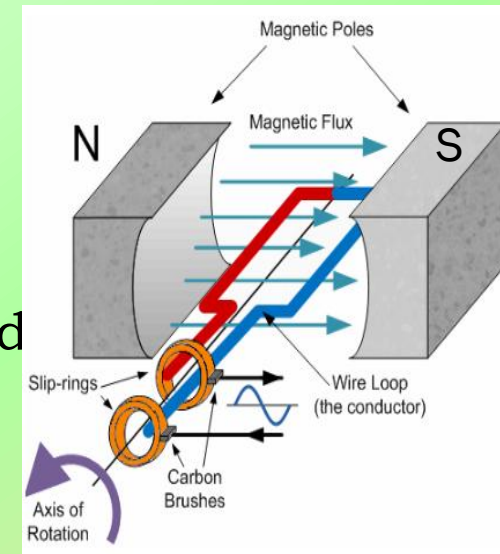
INTRODUCTION

- Wind energy is a “Renewable Energy”.
- India has the second largest road network in the world. National highways : 1,11,111 Km & State highways : 1,76,116 Km.
- The vehicles which run on the highways, run at a minimum speed of 60 Km / hr, which can provide a considerable wind speed of 10~20 Km/hr. This kinetic energy goes tapped.
- So, we have planned to use this energy in an effective way & decided to fix vertical axis windmills on the medians of highways to generate electricity.



WORKING PRINCIPLE

- Wind turbines convert the kinetic energy of the wind into Mechanical energy and then into Electrical energy.
- This electrical energy is fed to a chopper.
- Since the wind speed is not constant, the output of the generator will be varying frequently.
- Chopper regulates the output of the generator and charges the battery.
- Stored energy in the battery can be used to function LED based street lights and signal lights.

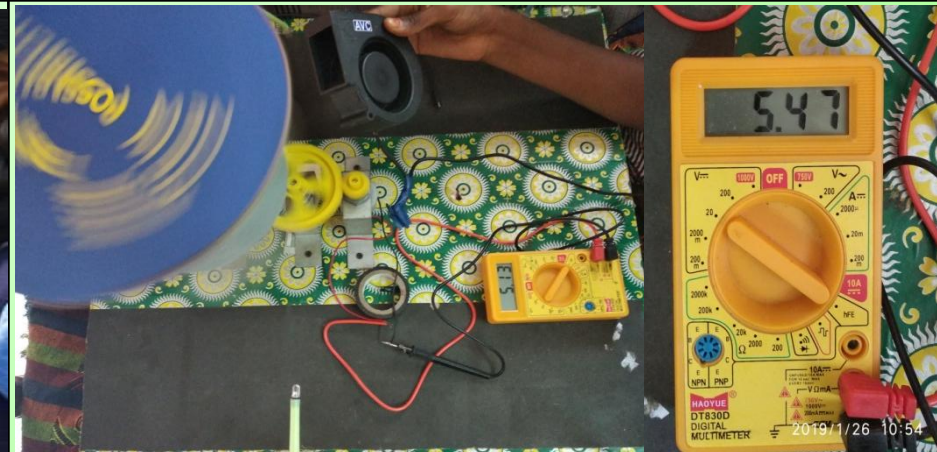


TRYOUT DETAILS

Measuring the wind speed in the highways medians



Measuring the current output by using Multi meter (Modified)



Taking the tryout with vertical windmill model (Old)



Taking the tryout with vertical windmill model (Modified)



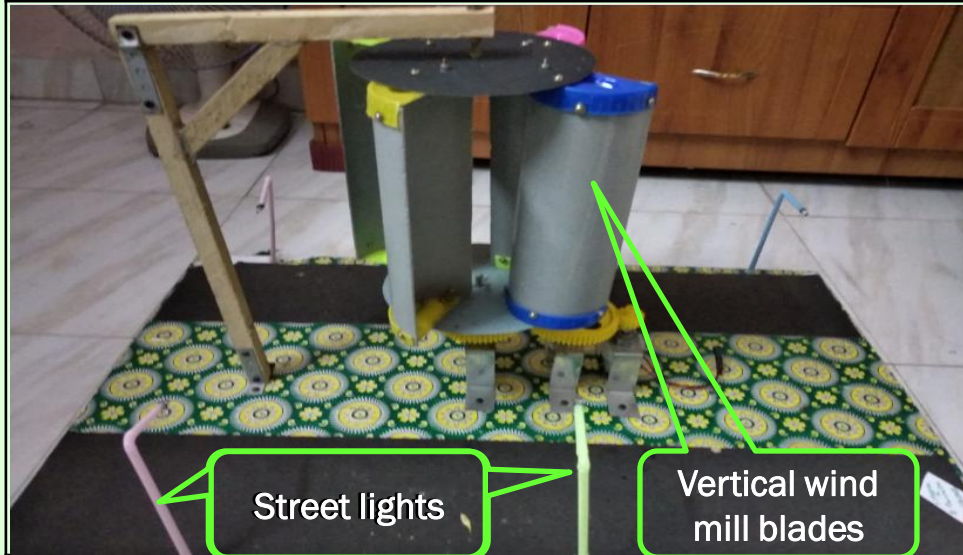
TRYOUT DETAILS

Data Analysis :

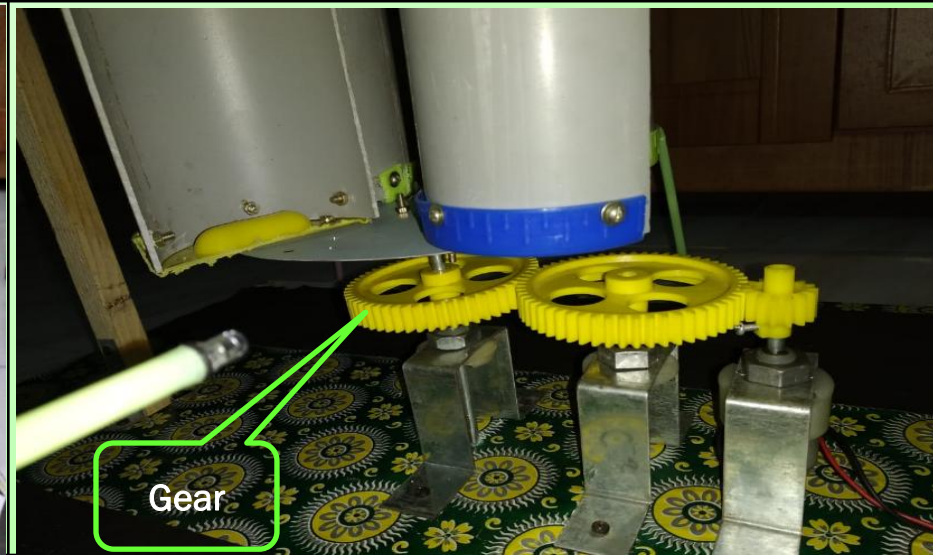
#	Details	Before	After	Remarks
1	Place	Jawaharlal Nehru Salai (NH 2), Madhavaram by-pass	Jawaharlal Nehru Salai (NH 2), Madhavaram by-pass	Different place
2	Date & Time	18.11.18 & 09:00 AM	13.01.19 & 10:00 AM	
3	Vehicle speed	50 ~ 90 Km/Hr	40 ~ 85 Km/Hr	
4	Wind Speed	10~20 Km/Hr	10~20 Km/Hr	
5	Rotation	Vertical windmill blade is little hard to rotate.	Blade rotation is free	Wind mill blade changed PVC → Plastic bottle

WORKING MODEL (BEFORE MENTORING SESSION)

Full image of vertical wind mill model



Close image of gear ratio & Generator



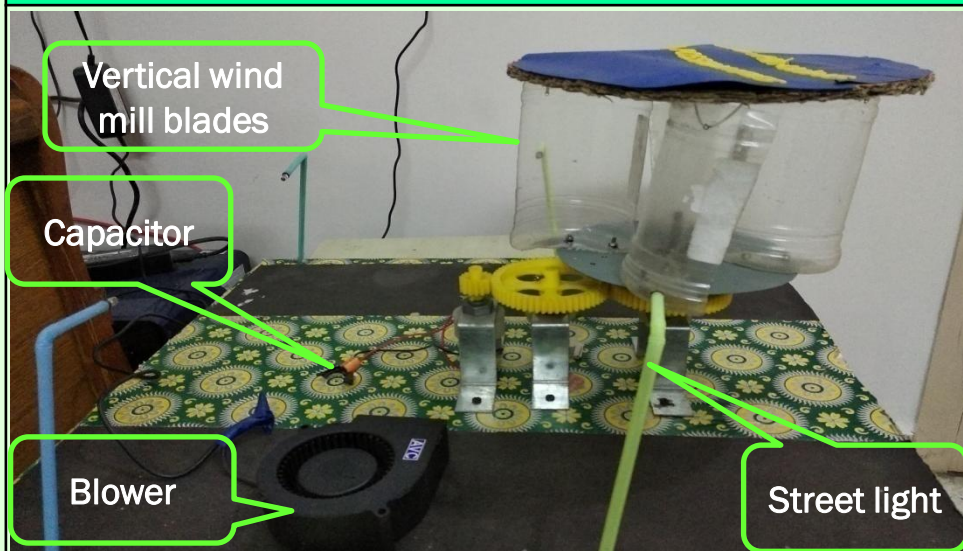
#	Part	Spec / Material	Remarks
1	Vertical wind mill blades	Ø85mm X 4 half PVC pipes Height : 220mm & 3mm Thickness	Weight : 0.6 Kgs
2	Gears	2 Big gears with 56 no. of teeth's One small teeth with 15 teeth's.	1 Big gear rotation = 3.73 times rotation of Small gear
3	Generator	12V X 1 Amps with 6 LED lights	



Model (Model.mp4)

WORKING MODEL (AFTER MENTORING SESSION)

Full image of vertical wind mill model



Close image of gear ratio & Generator



#	Part	Spec / Material	Remarks
1	Vertical wind mill blades	Ø100mm X 2 plastic bottles Height : 110mm & 0.5mm Thickness	Old unused plastic bottles used. Weight : 0.1 Kg
2	Gears	2 Big gears with 56 no. of teeth's One small teeth with 15 teeth's.	1 Big gear rotation = 3.73 times rotation of Small gear
3	Generator & Lights	12V X 1 Amps & 4 LED lights	Output : 4~6V Capacitor used in-between
4	Air blower	12V X 2.40 Amps	To blow air Video

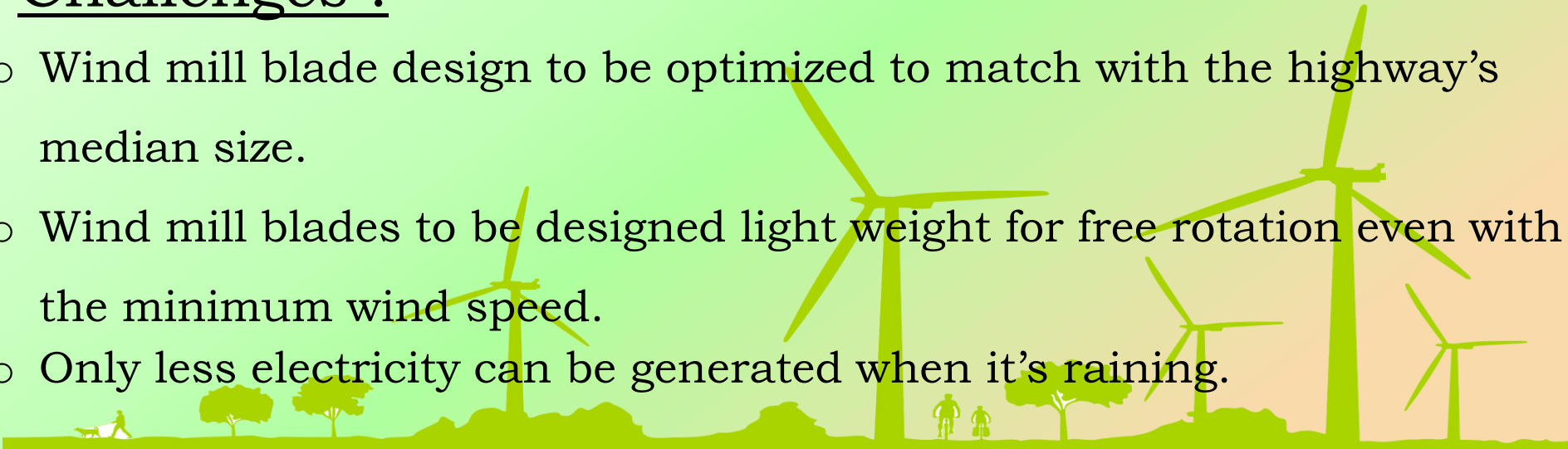
ADVANTAGES & CHALLENGES

Advantages :

- It is Green energy. Wind energy is easily available.
- We can produce the electricity with natural resources.
- Since road network is vast, we have a huge area for installation of more number of windmills.
- We can save the electricity consumption of the street lights and signal lights through non renewable energy sources.

Challenges :

- Wind mill blade design to be optimized to match with the highway's median size.
- Wind mill blades to be designed light weight for free rotation even with the minimum wind speed.
- Only less electricity can be generated when it's raining.



CONCLUSION

- By using this mode of generating electricity, we can produce more green energy.
- Although one Generator may not provide adequate power generation, a collective of turbines on a large strip of highway has potential to generate a large amount of energy that can be used to glow street lights, signal lights and other public amenities.

