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A Survey On: Energy Generation for Development of Smart Cities

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ABSTRACT: The world is facing an energy crisis due to diverse needs and limited natural resources. Therefore, an alternate inexpensive method of energy generation is required. Now a day's there is a drastic increase of vehicles in metro cities. So the movement of vehicles can be used to generate energy by placing speed breaker and wind vertical fan in mid of the highways. The aim of this survey paper is to find alternate method to generate energy that can be used for street lights and rural areas etc.

KEYWORDS: Speed Breaker, Wind-mill fan, Rack-Pinion mechanism, Roller mechanism, Silicon battery, Microcontroller, Ahmedabab Bus Rapid Transit System (BRTS), Doubly Fed Induction Generator (DFIG).

I. INTRODUCTION

Electricity plays a most important role in our day to day life. As we know power crisis is the major problem the world is facing. To avoid this energy crisis we have to use the renewable or sustainable energy more than non renewable one. The generation of electricity is done by two ways i) Conventional energy resources ii) Non-conventional energy resources. Conventional resources like coal, diesel and nuclear energy are helpful to generate electrical energy. The disadvantage of using conventional energy of resources is that it emits ash, smoke etc., which causes pollution in the environment on a large scale. The nuclear waste affects environment and human at serious level. As the usability of non-renewable resources becomes more availability becomes poor. So to avoid the utilization of conventional energy we find another way to generate power called non-conventional energy. The non-conventional energy is more reliable for example solar energy, wind energy, tidal energy. Tidal energy has disadvantage as it can only be implemented on the sea shore. The process takes long step to obtain Geo-thermal energy but solar and wind energy are available in all conditions. Energy is the basic thing that helps in day to day life. According to conservation law of energy "Energy can neither be created nor be destroyed". To achieve this we have many different ways like nuclear energy, solar energy, wind energy and water energy. Solar energy can also be converted into electricity using solar panels. Wind mills use the fans to store electrical power by rotating fan which helps to produce maximum electricity by wind. The high exchange between environment and energy disallow the use of fossil fuel, which aims to reduce the cause of green house gas effect. Road power generation system is one of the ideas proposed to produce electricity by implementing speed breakers. Vertical fans of wind mill will also placing at the middle of the road. The speed of the vehicles will help fans to get rotated and the rotational energy is converted to electrical energy. The electrical energy generated by these vertical fans of wind mill mechanism will get stored in the batteries. The stored energy can be used by electric cars to charge the battery, street lights and to supply power to remote or local areas.

II. RELATED WORK

The speed breaker takes a major role in reducing speed of vehicle and accidents by controlling frequency. The Ahmedabab Bus Rapid Transit system (BRTS) lanes that are provided in the public transit routes help in avoiding vehicle speed [8]. The authors propose the idea of generating electricity using a mechanism called a prototype for

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generation of power at speed breaker using a rack and pinion mechanism. This method works in very low cost and it doesn't require any fuel input. The drawback of this fabrication prototype is the initial cost and maintenance of mechanical moving parts of vehicle as frictional loss is more. The conventional source like coal, uranium, oil etc results in depleting. So to avoid conventional source they use non conventional energy as the sources for generating power. Thus it helps in maintaining the industrial growth and conserving natural resources [10].

The author's Shah Mohazzem Hossaina , C. K. Dasb , Md. Shahdat Hossanc , Sams Jarind, explain about how to use energy in the form of jerking force which got wasted in the vehicle pass over speed breaker. The jerking force helps us to produce electricity by using simple roller mechanism with easy way. The weight and the number of vehicles passing on the speed breaker give the amount of generated electricity. When more number of vehicles that passes on the speed breaker the production of electricity is also high. That area called as mini power plant [4]. Road power generation is one of the latest electricity generation techniques. The installation of flip plates on the road helps in conversion of kinetic energy into electrical energy. The rotational motion of rack and pinion mechanisms helps us to road power generation mechanism. Here when the vehicle move on the flip plate the rotation takes place. So, the energy that is generated based on rack and pinion mechanisms is known as kinetic energy. Flip plate's converts the rotational motion of kinetic energy into electrical energy after reaching to predetermined velocity. The generated energy can be used for lightening the street lights and to charge the batteries of the car, likewise the demand of sustainable energy is used [13].

The consumption of electricity is ceaselessly increasing day by day so that the demand for electricity is also high. So the aim is to presents the innovative method called green power generation by using renewable source of energy, which helps in avoiding of energy crisis by using of available resources. According to idea, the crankshaft and pulley stem or concept of fluid mechanics instead of gears to decrease the inherent complexities and difficulties [9]. The author's Aman Agarwal, Vani Dayal Sharma, Somya Agarwal proposed an idea to produce the electricity by implementing the speed breaker. The modifications are made in the rack and pinion mechanism that results in some advantages. The speed breaker mechanism helps in minimizing the noise pollution compare to nuclear and thermal power plants and with less expense for the set up of rack and pinion mechanism, it also introduce spring to check viability and also the installation is very simple and convenient [11].

The Hybrid Solar system promotes the socio-economic development to the local and remote areas. The system tries to reduce the CO₂ emission in the environment. The optimized wind-PV-diesel hybrid systems are cost effective. The hybrid solar system implements to combine with the renewable source of fossil fuel power plant. The rural and remote areas of India are get benefitted by reliable supply of electricity [12]. The author's are mainly concentrates on reducing the load shedding by using the solar and wind energy. Limiting the charging and discharging of voltage that increases the life of the battery. The amount of stored electrical energy in battery can be supplied to remote areas near highways. Power fluctuations can be avoided by constant supply to the loads. The wind and solar energy plays an important role in supplying of sustainable energy to reducing electric bills and to tolerate power fluctuation. The main aim is to maintaing the battery for long time usage [6]. The author's Shashikanth Reddy , MD Mastan Ali and N.Srikanth Reddy tries to generate the power from the solar panels and saved in the batteries for later usage. The idea is implemented in industries and gated communities for the usage of power to be minimal. It should use large storage device to store energy is a main disadvantage [3].

The author's Dr. T. Govindaraj and Mr. K. Bharanidharan proposed a solar wind hybrid approach is based on a closed-loop PI microcontroller that stores power system voltages combined with stability under normal load conditions to save energy and eliminate steady state errors. The simulation focuses on the ability of the strategy to increase exposure of closed-loop. This system helps in maintain the balance and stability of the power system [1]. The author Archana, Mr. Abhayrajsinh J Rana, Mr. Pavan Mehta tries to present a combination of wind and photo voltaic energy system is for standalone system. This combination will be better than single energy source. This is not technically suites for low wind speeds and not predictable than solar energy and also combined utilization of renewable source. The acceptance by the user gives the ability to maximize the attractiveness and highlights the future developments [5]. The photo voltaic system employs solar panels which comprise the amount of solar cells that generates electricity, initialization can be grounded, mounted on the roof, mounted on the wall, they can assemble solar tracker. The vertical axis of wind turbine placed on a highway that meets the demand for the energy. Also the

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performance of the wind turbine should be tested. Wind turbine can be improved in the production process and applicable in highway lights [2].

The author's Vipul Dhongade, A.D. Shaligram proposed the design configuration for combined system to the production of efficient energy using EV charging stations. The energy is produced from hybrid system describes the configuration of rugged industrial controller with data acquisition system. The power generated by the renewable source can be used anywhere and anytime. The aim is to focus on rural areas because the energy is not sufficiently supplied compared to metropolitan cities [7]. The Doubly fed induction generator (DFIG) is more popular than the fixed speed turbine. It has the capacity to earn the maximum energy from wind. It improves the quality of power and reduces the mechanical stress on the wind turbine. Doubly fed induction generator (DFIG) generates a power which is independent of the speed where the frequency of the grid helps to produce voltage. The wind turbine has the certain wind speed range operates at aerodynamically optimal point. The main advantages like less weight and more cost effective. The proposed design were adopted depending on the interpretation of the time and rotor current of the doubly fed induction generator (DFIG). The effectiveness results in simulation and applicable for symmetrical grid faults [14].

III.METHODOLOGY

- Rack-pinion, crankshaft mechanisms
- Roller mechanism
- Wind mill fan

Rack-Pinion, Crankshaft mechanisms

The flip plates are mounted on the surface of the road and were followed by the fabrication of this rack and pinion. Pinion attached to the shaft attached to the bearing and frame. This frame is placed under the road. Roller wheel are mounted on the shaft, and other roller wheel are mounted on the dc generator, the united belt.

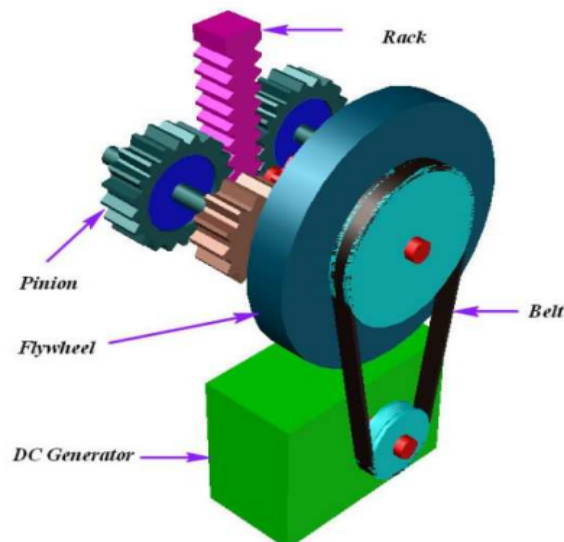


Fig 1: Rack-Pinion mechanisms

Roller mechanism

Roller can be placed on the road humps, when the vehicles pass through the road humps the roller gets rotated. Due to rotation of roller the rotational energy is converting into electrical energy.

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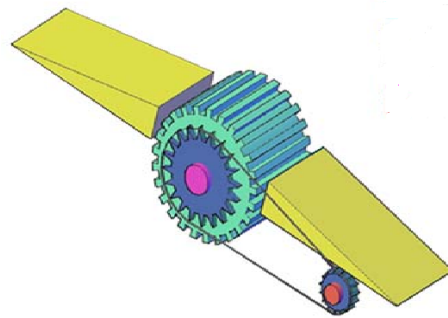


Fig 2 Roller mechanism

Wind mill fan

In a hill station we place a wind mill to generate wind energy by using wind fan with the help of air flow. We use small plots to produce wind energy as an alternative to fossil fuels, renewable, rich and spacious and clean green house gas emissions.

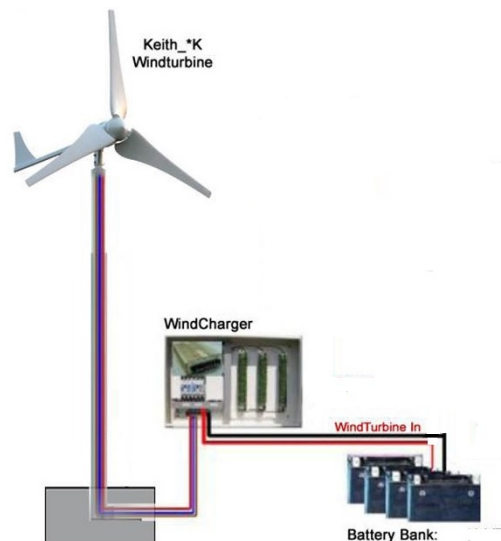


Fig 3 Wind mill fan

IV. CONCLUSION

There are different methods used for generation of energy. They are conventional and non conventional energy. Conventional energy generation is not so reliable and pollute environment which in turn affects the human health. Hence non conventional energy production is used to generate energy which is more reliable. The non conventional methods are like wind energy, solar energy, hydroelectric and biomass energy. There are some disadvantages in non conventional energy. Energy generation using wind energy requires setting up of wind mill in hill stations and energy generation using nuclear power plant is cost effective. The aim of the survey is to give information about methodologies used to generate energy in an efficient manner.

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