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Gym Power Station: Turning Workout into Electricity

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Abstract - *Energy is the key point to drive and improve the life cycle. The consumption of energy is directly proportional to the progress of mankind. The field of energy conservation is becoming an increasing notable subject of research among the scientific community today. Renewable Energy Technologies are very important in present and future generation for generating power. Different methods are proposed already for power generation using non conventional energy sources are solar energy, Wind energy, Tidal energy, and Biomass energy, Fuel Cells, Geothermal energy and human power[1].*

Human power is a power produced from gym exercise. Human powers can another renewable source of energy. The intention of this project is to design a system based on renewable energy source. A generator used here is the 24V motor which is powered by a gym bicycle. A motor is connected to gym bicycle in such way as the circular rotation of the front wheel rotates the motor shaft. The resulting direct current is converted into different usable DC voltages levels. By converting this DC voltage into AC levels. It will useful to light bulbs, laptop and mobile charging, musical system and other appliances. This will reduce the energy demand in today's life.

Key Words: **Prime mover, Gym equipment, generator, Inverter, DC motor**

1. INTRODUCTION

The energy expended in typical workout at the gym is usually wasted in the mechanics of the equipments. So this energy can utilize this by converting this mechanical energy into electrical energy. It is known that the supplies of fossil fuels are limited and their utilization as energy sources, in addition to this world population increase the order for energy sources increases, so the issue of a steady replacement of fossil fuels with renewable energy source is major consideration for the most countries. Renewable power generation system is currently preferred for clean power generation[2].

With ongoing revolution in the generation, electricity is generated at small level by using gym bicycle. Most of these villages are un-electrified. The total number of un-electrified villages in India as on 31-05-2015 was 19706 [3]. To power up these villages, the electricity generated by gym bicycle converted from mechanical energy to electrical energy using motor as generator will helpful. As energy usage across the world continues to rise, there is need to develop new sources for electricity generation that have less environmental impacts. Human power an alternative for energy generation and human power is easily available in human exercise. The project focuses on the ADCET Sport Complex at Ashta, Sangli. The system is tested in ADCET Sport Complex. This project is based on the renewable energy source. Fig 1 refers to proposed system of this project. Renewable Energy Technologies are very important in present and future generation for generating power.

This project plays big role into save energy save electricity.

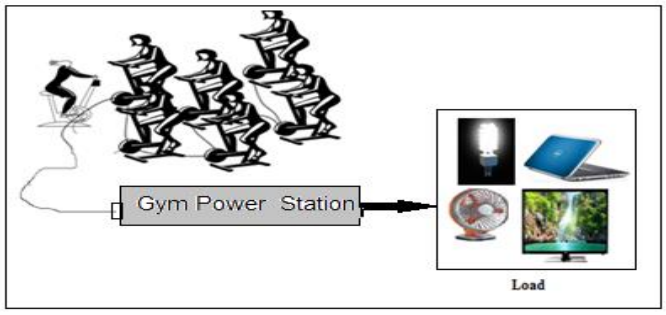
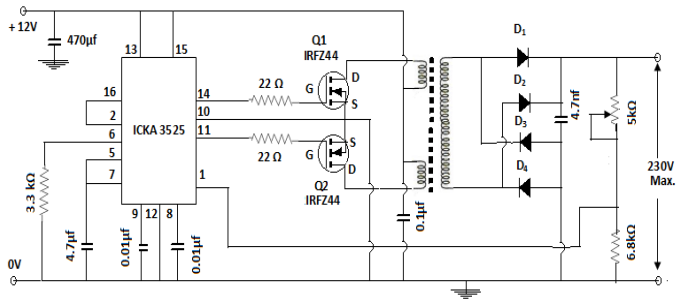


Fig-1: Proposed System



2. PRESENT THEORIES AND PRACTICES

The idea of first sustainable gyms was conceived by Italian inventor Lucien Gambarota. He partnered with entrepreneur Doug Woodring and Hong Kong-based company California Fitness (now known as the Motorwave Group) to open the world's first such gym in 2008. California Fitness's president at the time, Steve Clinefelter, explained the concept's advantages by giving the example of a treadmill modified to generate electricity. Other Sustainable Gyms also open in 2008 was "The Green Gym" by fitness instructor Adam Boesel in Portland, Oregon. Boesel's goal is complete sustainability, but in the meantime, his gym has been able to reduce its carbon emissions by 60% [4].

3. PROBLEM DEFINATION

Energy is the most important factor and input to the society, economic, industrial and technological development of a country. Human like to live good and comfortable life irrespective of cost of energy source and environmental impacts. And day by day energy demand is going on increasing. So it is important that human need to use waste energy. In gym the energy is wasted in workout. This human power can use to generate renewable energy source. This project will generate energy from gym bicycle. Human are good.

4. METHODOLOGIES

Fig.(2) refers to the block diagram of the gym power station turning workout into electricity which consists of prime mover connected to motor as generator, battery, inverter, transformer, load.

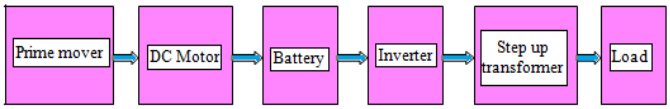


Fig-2: Block Diagram

The prime mover is a part of gym equipment. The motor is used here is the 250W, 24V, 2650RPM motor. The working principle of motor is same as DC generator. To store DC voltage 12V, 7.5Ah, battery is used. To convert DC voltage to AC voltage inverter circuit is used. The figure 4 shows inverter circuit diagram. The transformer is used to step up the voltage to 230 V. The load can be bulbs, laptop charger, mobile charger, musical system etc.

Fig-3: Inverter circuit diagram[5].

Working of inverter circuit:

The KA3525A is a monolithic integrated circuit that includes all of the control circuits necessary for a pulse width modulating regulator. There are a voltage reference, an error amplifier, a pulse width modulator, an oscillator, an under voltage lockout, a soft start circuit, and the output driver in the chip. KA3525 has an inbuilt oscillator whose frequency can be determined by connecting capacitor and resistor on pin 5 and pin 6 respectively. Output is taken from pins 11 and 14 which are connected to the gates of MOSFETS. The signal from two pins 11 and 14 are connected to the gates of power MOSFETS IRF Z44 which switch current to each winding of the transformer. Only one winding is activated at a time and both are energized in opposite directions. Activation of winding in opposite direction helps to produce an alternating EMF and thus alternating current (AC) on the secondary of the transformer[6].

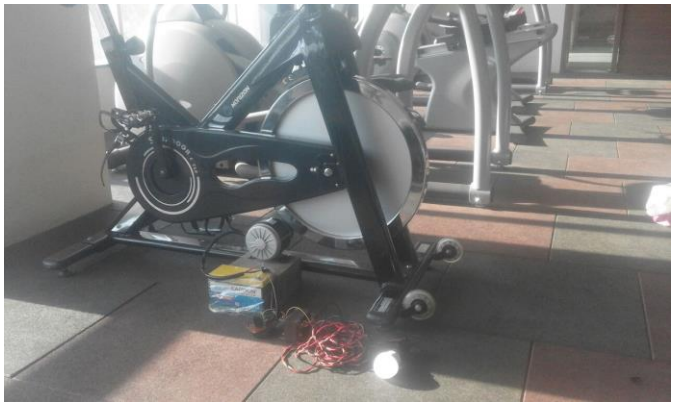


Fig.4: Electricity from gym bicycle

Fig. 4 refers to the arrangement of motor and gym bicycle and output load. The load is uses the electricity generated from the gym bicycle.

5. APPLICATIONS

This project contributes the role in reducing energy demand. The electricity generated from this project will power the light bulbs, tubes, laptop charging, mobile charging etc. Some villages are facing problem of electricity shortage this system will help in this need. This project also help in mountain areas where electricity difficult to reach.

6. CONCLUSION

India planned for smart cities; the number of gym may be increases in the smart cities. And the today's generation is attracting towards the gym exercise. So the energy generated from the gym bicycle will contribute the big role.
As number of gym equipment increases the total power generation will increase. It will definitely helpful in reducing today's energy demand.

7. FUTURE SCOPE

The fitness is important factor in modern life and people are interesting in gym exercise. This system is first implemented on gym bicycle. The other equipments are available Leg Extension, Lat Pull down, Adjustable Cable Crossover in the

gym. This equipments can be used to generate electricity .Hence gym can automate by using gym equipments.

ACKNOWLEDGEMENT

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