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Sustainable Fuel Technology Based E-cycle

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Abstract

The developing countries like India are facing energy shortage in production so many researches are concentrating on knowable energy sources. In renewable energy sources the energy extraction 100% not possible or notated one and in case of transport the renewable energy position is very less and facing lot of problems in battery and its management system. In this article a proposing concept of a bicycle which is need to be utilising in a remote location like mining areas. Old fashioned recreated who travels in a moderate distance the main objective of this project is to design a motor generator set with battery system through appropriate controller will give sustainable energy with which need not to charge the battery frequently and less capacity of the battery can travel more distances. Whereas by using this concept supervising and maintenance people can use this type of E-cycle mine area.

Keywords: *Driving Strategy, Energy Saving, E-Cycle, Fuel Technology, Physical Activity, Self-Charging*

1.0 Introduction

The drastic growth in the technology and development in electronics components and it's a done leads to the invention of leads to the human life so, satisficed. In compare to the decades the transport fields also have emerged so drastically. The use of motor transport in India is about to 85% of population[1]. Within hour 30 min per day as to do. Now day's peoples are aware of it and spending lot of time and money in gym and sport activities regularly, which needs trainers and except in sports, through these activities the people will get relief from the health issues like BP, diabeties[2]. Promoting bicycle use in cities is one of the most common ways of encouraging active transportation among users. Biking not only helps people get in shape, but it also helps to reduce traffic congestion, climate change, environmental contamination and energetic sustainability. The development of electric bicycles, or E-bikes, is a critical component in boosting the usage of bicycles[3]. An electric bicycle's three essential components are the engine, battery, and control system. These parts are installed in a traditional pedal assist bicycle, which combines the user's power with the power supplied by the electric motor.

In comparison to traditional bicycle, these are power-assisted bicycles capable of covering longer distances, increasing mobility and removing impediments such as age, physical limitations, steep slopes, and a lack of time[4]. The main objective of the paper is to design a, hybrid power electric bicycle that involves four different ways of battery charging, solar, human pedal assistant system then regenerating and supply system and alternator or generator the focus of this paper is to perform power calculation of motor and alternator set corresponding design of electric bike[5]. The proposed system has been modified so that the raider can choose which mode he prefers, which is either the bicycle to be driven entirely

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by the PAS with which he can burn calories of energy and keep his body fit. He can also choose the mode of the bicycle, which is entirely powered by an electric motor[6-8]. The idea of designing motor come alternator assembles into geared bicycle. Pollution also increases linearly with the use of motor wheels. Due to this people are adopted to activities such as working in front of computers. Due to this health issues now as per the 150 min per week.

2.0 Literature Review

"The electric bicycle: Worldwide research trends", the six primary clusters of this study, which are primarily focused on the transportation sector, were identified using a community detection technique – Environmental, some of the topics covered include electrical engineering, safety, batteries, sporting goods-urban planning, and mechanical engineering. However, this system was not provided for increase understanding of the e-bike's use and safety, with a focus on two important issues, first, enhancing road safety, and second, minimizing the negative effects of conventional lead-acid batteries in favor of less environmentally polluting ones[9].

"Fabrication of self-charging electric bike" The batteries power the motor, which drives the electric bike forward. When the battery is completely discharged, the battery is recharged using a DC motor or generator attached to the bicycle's rear wheel. The true issue with electric motors, however, is with battery charging, which was not addressed by this system[10].

"Solar e-bicycle": The hub motor of the developed solar-assisted bicycle is powered by a DC motor that is installed in either the front or rear axle housing and is powered by solar energy[11]. Solar panels mounted on the carriage charge the battery, which in turn powers the hub motor. However, this system was not offered. It consists of two components, hardware and software, with the hardware being the bicycle and the software being the programme controller. The components of this system are: 1. Solar energy to recharge the battery; 2. A PIC microcontroller for the charging system; and 3. A high torque motor to drive the bicycle.

"Increasing the intensity over time of an electric assist bike based on the user and route: The bike becomes the gym", where an app for a bicycle with an electronic Pedal-Assist System (PAS) that enhances pedaling effort, allowing the biker to accomplish increasing levels of physical activity. However, this method was not offered. The system's design establishes various assist levels in a tailored manner, taking into account the route's profile, the power needed, and the user's degree of ability. When a user takes new routes, the system rewards them with higher scores, and when the higher score is achieved, the user receives more assistance, the greater the user's average speed on the routes cycled, and the greater the user gradually increases his or her physical activity level, increasing their fitness, and decreasing the amount of power required to produce the progressive rise in speed.

3.0 System Design

Figure 1 explains the proposed block diagram of our project with major components of motor, generator, battery and controller for my project in our proposed project recommended to chosen bladeless dc motor as a primary source for driving the vehicle which is arated at 350 watts, 36 volts, 15 amps based on our application it shown in Figure 1. The battery places a major role in our project the battery along with.

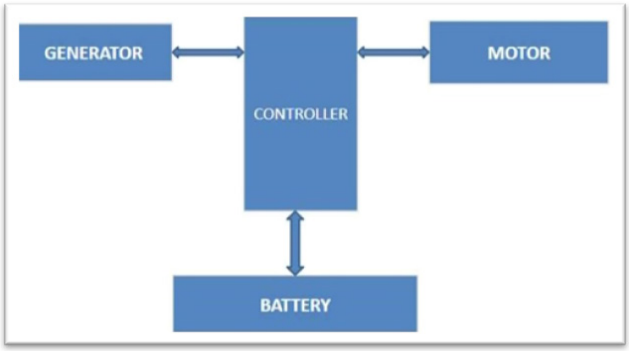


Figure 1. Block diagram of proposed system.

Battery management system at 36 volts, 15 amps rating it is shown in Figure 2 was designed for our application. To increase the driving time of a vehicle with existing the same rating of battery capacity is proposed a coordinated controller inconjunction with hybrid source energy of solar and simultaneous generation from alternator. The controller is designed in such way that it coordinates that the energies from solar battery and alternator in device is driving mode the buck boost converter the proposed

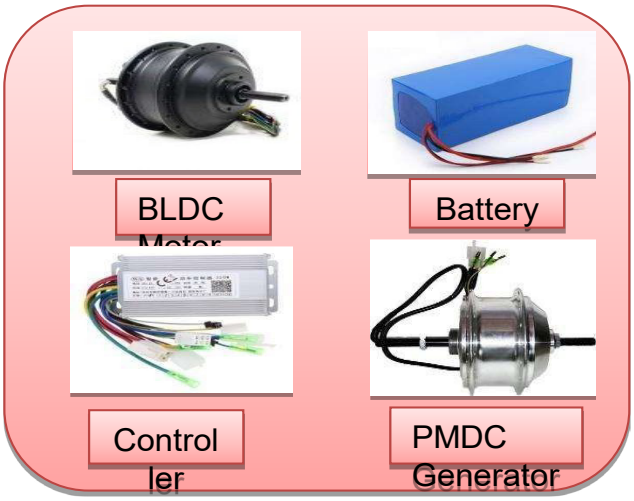


Figure 2. Various parts of e-cycle.

for alternator and solar panel energies to coordinate with the battery. The controller the main objective is to supply energy to the motor in driving mode from solar and PMDC alternator 350 watts, 36 volts, 15 amps rating and the deficiency of energy only supplied from battery with which the driving distance is increased. Which is the tested practically which the proposed system.

4.0 Implementation

This block diagram explains the improvement of voltage regulation for respective fluctuations in the speed for corresponding the rides. Based on the design specifications in this article 350w BLDC motor with 350w PMDC generator in coordination with back-to-back lithium ion batteries one for motor and another for generator were connected at initial, later test case was designed in such a way that the controller is capable with single battery for charging and discharging simultaneously. The controller design is shown in the Figure 3.

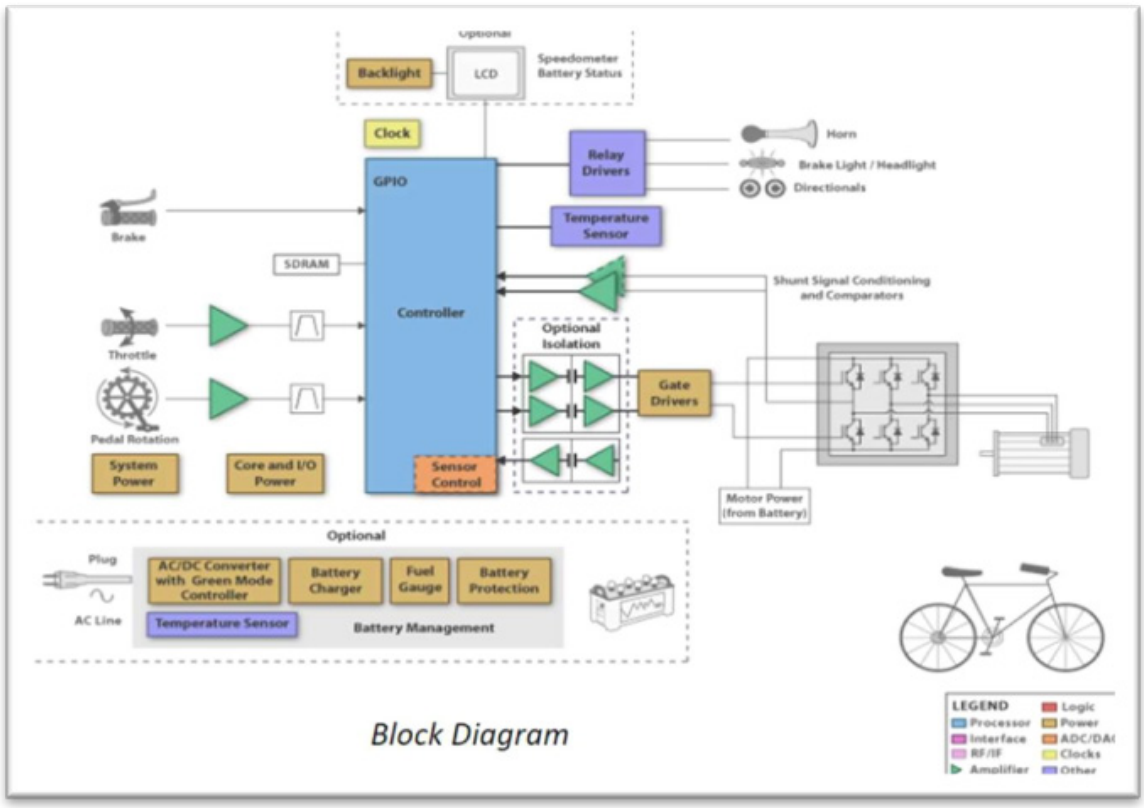


Figure 3. Block diagram of BLDC motor with controller.

a. Calculation

Power required accelerating the bicycle from the start

F = ma = 160*0.80

F = 128N

P = FV

V = Average speed V = (Vi+Vf)/2

The speed Vi will be zero. At the start. V = Vf/2 = 8/2 = 4m/s

P = 128*4 = 512 watts

Power required = 512 watts are needed.

b. Calculation of Battery Power

Series-connected batteries

Two 12V batteries with a combined capacity of 15.7Ah are linked in series.

Total wattage = 24 * 15.7 = 378.8Wh

A watt engine uses 1Wh of energy every hour. Thus, a 360-watt motor consumes 360Wh for a total of 1.02 hours. Thus, the electric bicycle's calculation assumes that it is being ridden at a speed of 25 to 40 km/h, which results in a 30 km/h mileage with each battery pack or generator.

c. Calculation of Power Generation

The generator or reverse DC engine generates 36 volts at 3 amps.

If a 24V battery is to be charged at 3ATime = Ah/

Ah = 15

Ah/3 = 5.23 hours.

A 36V battery can be charged completely in 5 hours.

It would be wise to select lithium ion battery over other batteries when taking the necessary elements into account. Carefully charging a lead acid battery is essential to prevent heat production. The battery has a 350Wh rating and the engine uses 350 watts per hour. Therefore, at an average speed of 40 km/h, a single battery pack can journey 30 km. Battery pack 2 is charged by motor 2 at a power rating of 36 volts and 3 amps while discharging occurs concurrently. But it is impossible to completely recharge the battery pack 2. The power provided by motor 2 can generate more than half of the charge. This gives the e-bike a greater range.

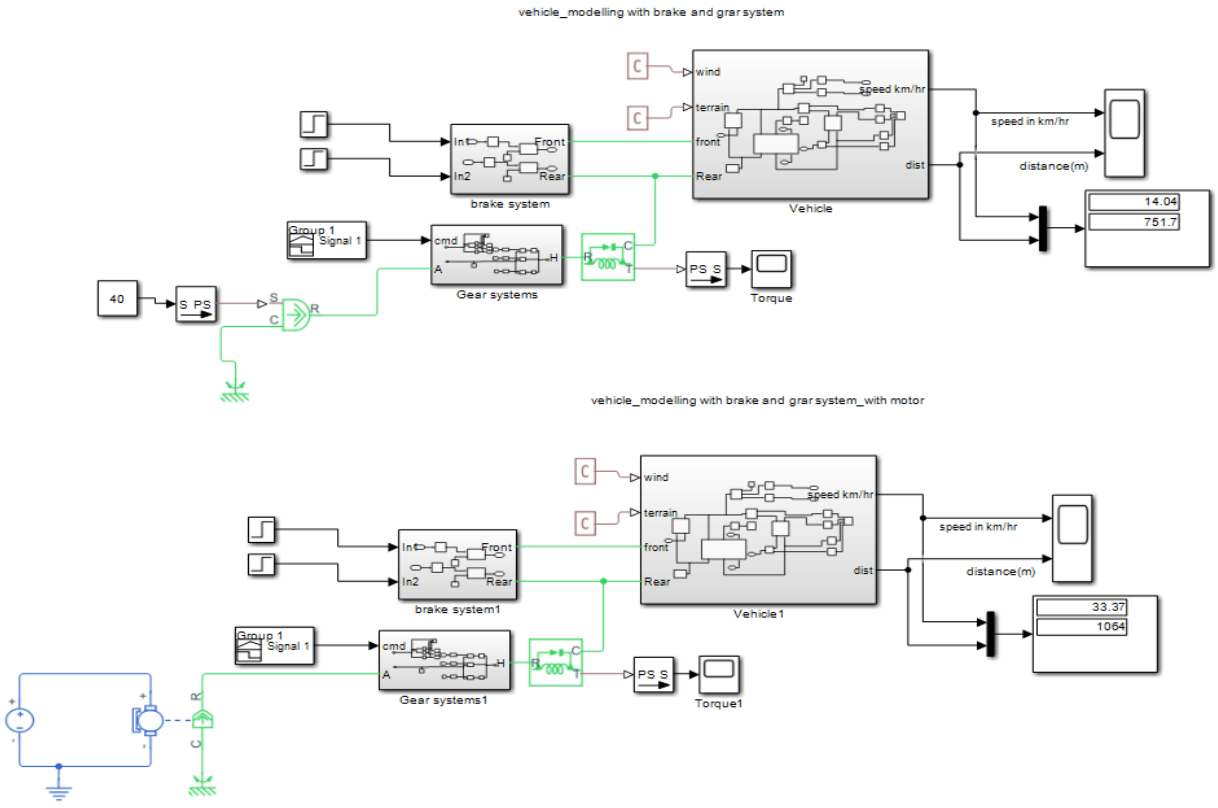


Figure 4. Simulink diagram of BLDC motor with controller.

5.0 Results and Outcomes

The concept of voltage fluctuation in the different riders values have been simulated in MATLAB and the respective outcomes is shown in the Figure 4 and 5 for the parameters for speed and distance.

Before starts to develop the hardware which shown in the Figure 7 of the proposed, the same is implemented in MATLAB software, tested and validated.

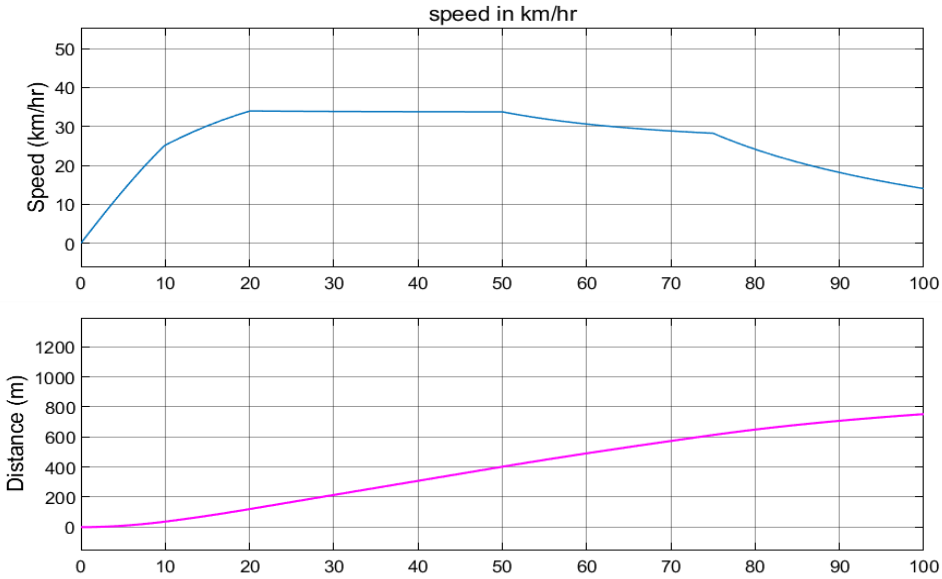


Figure 5. Torque and speed versus time (s) with MATLAB.

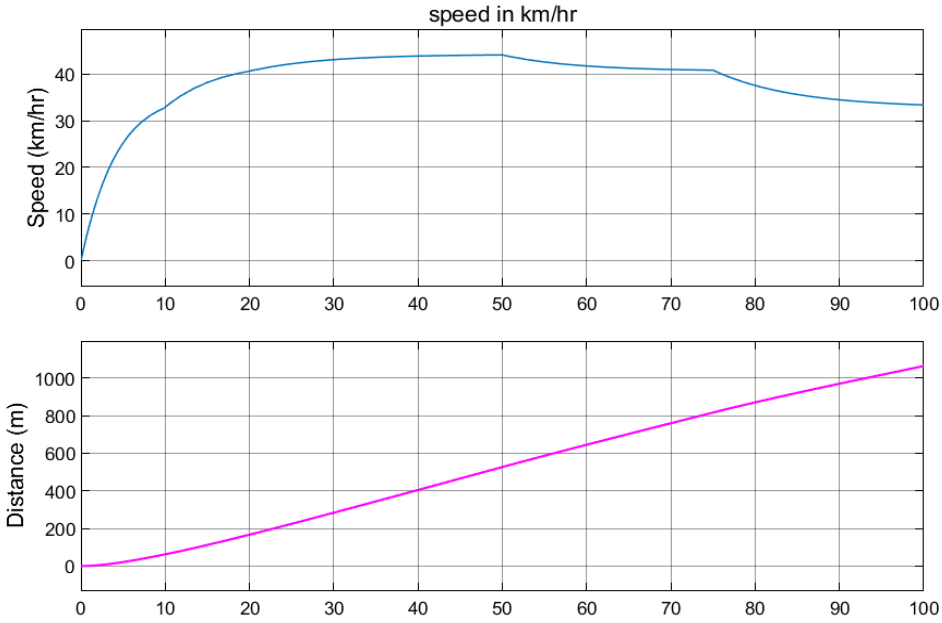


Figure 6. Torque, speed, slip and force versus time (s) with MATLAB.



Figure 7. The hardware development of sustainable e-cycle. **(a)** Motor at back wheel **(b)** Generator on front wheel **(c)** Controller placed on the bar **(d)** battery with BMS.

6.0 Conclusion

- This article presented the strategy, by focusing on enhanced the range motor electric bicycle, which we can use in the mining areas for employees working in mines and based on proper selection of controller and PMDC generator the implementation of mathematical model of system and its variation are done with MATLAB simulation are presented. Improving the bicycle range is complex on it comprises multiple variable such as travel time route, battery capacity and user ability level wind speed power delivered by the cyclist.
- Objective is achieved by designing a proper appropriate controller along with proper selection of generator which is placed in the front wheel in the bicycle and its coordination with battery and solar energy our project may provide a solution for the existing system problem of long range travel.
- Which depends on the battery capacity was given by providing a PMDC generator that supplies energy while riding for future work when we are working on by carefully choosing a generator motor set based on the weight of the vehicle, the rider, and the route will supply free energy that is sustainable for the bicycle that may need to charge less bicycle.
- It is a modification of a current bicycle that is powered by hybrid energy, smart in operation. This bicycle is less expensive (it costs only 26000 rupees) and easier to build, making it suitable for both city and rural roadways. Widely utilized

for short-distance and local moving at 40 to 60 km/hr.

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