

Development of Two Wheeler Motorcycle with an Alternate Power Source during Dry Condition

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ABSTRACT: *In the modern era our society is face a problem with the fuel of automotive vehicles in our present research we trying to solve somehow fuel problem in the old two wheeler vehicles at dry condition by making a assembly for it. It strikes a right balance between fuel consumption and pollution control and can be optimized effectively in future generation vehicle. A hybrid motorcycle capable of mounting thereon a hybrid type drive unit, which does not project in a vehicle width direction and can be mounted even on a having a limited vehicle width, includes a power distributing device positioned between a generator and a motor, and a reduction device arranged rearward of the transmission device is journeyed on a rear end of a central storage casing so that a rear end of the drive-wheel transmission device.*

Keywords: *hybrid vehicle, battery, BLDC motor, controller.*

1.INTRODUCTION

Technological advances make the human life more comfortable, but on the other hand, these advances cause many problems and damages in the human life such as environmental pollutions. Fossil fuels consumption in the vehicle engines contaminates our environment and this is one of the main issues in

This regard. Reducing environmental pollutions is a global plan nowadays, and using electric and hybrid Electric vehicles and substitution fuels such as ethanol are among the solutions to reduce the

emissions or not to let them increase. The hybrid technology and hybrid electric vehicles are put forward as a new argument and because of its specifications, it is expected that this technology becomes more and more popular. Since 1998, the commercial hybrid electric vehicles are introduced in the market. Fuel consuming motorcycles are one of the ordinary vehicles in the urban transportation. Urban transportation requires a low output power and it causes the incomplete combustion and more air pollution because of the low permissive speed and many cycles of braking and movement. So, many researches all over the world have been trying to solve this problem by different methods such as hybrid concepts. Until today, a few Companies produced some experimental models of the HEM. For example, Yamaha has introduced a hybrid motorcycle which was named Gen-Ryan in the 39th Tokyo motorcycle exhibition. ECycle Company in the United States has produced another hybrid motorcycle model named EC1 with Brushless motors. In this paper, at first an ordinary ICE motorcycle is simulated. Then a converted hybrid is simulated and compared with the simulation results of the ICE motorcycle. A BLDC motor is installed in the front wheel. A central electronic control unit is used to change the motorcycle modes. In Iran there are around 8 million motorcycles. Almost one third of that is in the capital Tehran. Therefore, there is a real need to reduce the motorcycle emissions. A hybrid fuel-cell motorcycle was designed by some

researchers in Iran, but the present HEM is the first prototype in Iran.

II.OBJECTIVE

As according to IOCL (Indian Oil Corporation limited) and HPCL (Hindustan Petroleum corporation limited) the average distance between two petrol stations is somewhere about 6 kilometers to 8 kilometers so many times two wheeler Consumers mainly face some hazardous situations during dry state of vehicle so this system going to empower the system which will help consumers to reach nearest fuel station on alternative source This is nothing but battery. And other time it will work as a hybrid system.

III. LITERATURE REVIEW

[1] S. Vanangamudi, S. Prabhakar, C. hamotharan and R. Anbazhagan. **“Hybrid Two Wheeler”** (2014) Says The project of fabricating a hybrid two wheeler was completed successfully. It strikes a right balance between fuel consumption and pollution control and can be optimized effectively in future generation vehicle. A hybrid motorcycle capable of mounting thereon a hybrid type drive unit, which does not project in a vehicle width direction and can be mounted even on a having a limited vehiclewidth, includes a power distributing device positioned between a generator and a motor, and a reduction device arranged rearward of the transmission device is journal on a rear end of a central storage casing so that a rear end of the drive-wheel transmission Device.

[2] Arun Eldho Alias¹, Geo Mathew², Manu G³, Melvin Thomas⁴, Praveen V paul⁵, **“Energy Efficient Hybrid Electric Bike with Multi - Transmission System”** (2016) says In automobile sector, the need for alternative fuel as a replacement of conventional fossil fuel, due to its depletion and amount of mission has given way for new technologies like Electric vehicles. Still a lot of advancement has to take place in these technologies for commercialization. The gap between the current

fossil fuel technology and zero emission vehicles can be bridged by hybrid technology. Hybrid vehicles are those which can run on two or more powering sources fuels. This technology maximizes the advantages of the two fuels and minimizes the disadvantages of the same. The best preferred hybrid pair is electric and fossil fuel. In this paper the Hybrid bike system, the power is delivered both via an internal Combustion engine and electric motor. The electrical power is used to achieve either better fuel economy than a conventional vehicle, better performance and it cause less pollution. Driving mode selectivity improves this system more economical, stable and more efficient.

[3] Behzad Asaei,

Seyed Hosein Seyed Mohammadi Aghil Yousefi Koma, Mahdi Habibidoost **“Design, Simulation, and Implementation of an Electric Hybrid Motorcycle”** (2011) **“Hardware Design Considerations for an Electric Bicycle Using a BLDC Motor”** says A traditional bicycle is a two-wheel vehicle that is propelled by the rider who delivers muscle power through pedals that rotate one of the two wheels. The rider steers the front wheel to create a force that returns and maintains the vehicle centre of gravity into a stable zone whenever necessary, thus keeping the bicycle upright. An electric bicycle carries batteries that deliver electric power to a motor that is coupled to either wheel. In most electric bicycles the rider can choose to use muscle power to deliver all, part, or none of the propulsion power required to maintain an adopted travel speed. Some models even sense pedal pressure and command the motor to deliver more power whenever the rider pedals harder.

IV. PROBLEM STATEMENT AND PARAMETER REQUIRED

To make an impactful futuristic project to achieving our aim we have to consider some parameters which are as follows:

1. Range: About 10 to 20 kilometers it should cover.
2. Speed Range: it should go up to 40km/hr.

3. Torque Range: it should carry about 230 kilograms of weight on full tank fuel and then 180kgs onelectric drive.

Problem which we could going to face:

1. Motor and controller selection according to which we will going power our BLDC motor hence which drives our front wheel.
2. Problem of throttle as our petrol engine consists of butterfly valve but in electric propulsion drive we need to sense the throttle angle to manipulate voltage and shaft rotation.
3. After the work then comes battery selection how much battery needs to power the motor and how much time it will last?
4. Biggest problem is to how to put all components in a single unit from which we will compensate our system with regular vehicle so it could doesn't affect design of our regular vehicle.

V. THEORY

A) Working of system:

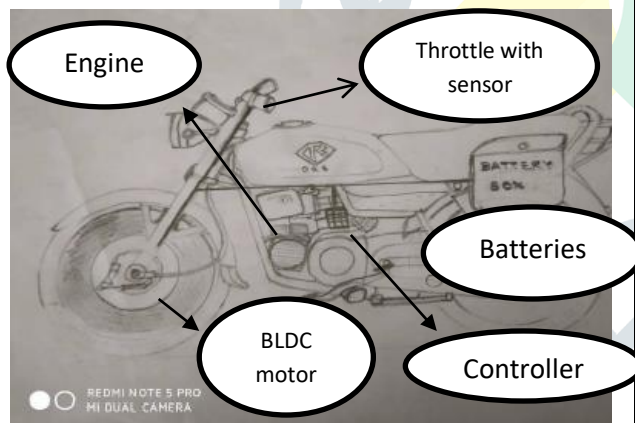


Figure 1: Hybrid Motorcycle diagram

As vehicle moves on primary engine that time external batteries will charge as our alternator is also moving and battery will charge as vehicle comes to dry state then consumer will switch off the main engine and switch it too external propulsion system which is hybrid system . Then as we know voltage is directly proportional to speed and current is directly proportional to current so as the consumer rotates the throttle which is on the ill side (left side) the throttle position sensor will sense the angle and give

signal to controller which is brain of whole system which will gain values from sensor and then provide and give optimum value of voltage to the BLDC motor to drive according to consumer use. So as the value of voltage varies then speed of motor will also varies this is how our system will work. And diagram shows how our prototype will look like.

B) Components of system and specification:

1. BLDC Motor

Table 1: Specific wheel in drive motor

Sr.No.	Parameter	Value
1	Rated power	15KW
2	Rated voltage	300V
3	Rated Torque	135Nm
4	Rotor Type	Outer
5	Torque constant	2.62Nm/A
6	Voltage constant	2.62Nm/A
7	No load speed	1320rpm
8	Rated speed	1070rpm
9	Efficiency	94.3%
10	No.of Phases	3

Table 2: Design parameter of motor

Sr.No.	Parameter	Value
1	Outer diameter of the rotor core[mm]	406.4
2	Inner diameter of rotor core[mm]	361
3	Outer diameter of the stator core[mm]	359
4	Inner diameter of the stator core[mm]	251
5	Magnet thickness[mm]	8
6	Air gap[mm]	1
7	Length of motor[mm]	178

Table 3:ThrottlePosition sensor vs voltage

Throttle position sensor		
Rotational angle	Throttle travel	Signal voltage
0		0.000
	Under travel	
10		0.450
13		0.901
20		1.440
30		1.900
40		2.370
50		2.840
60		3.310
70		3.780
80		4.240
84	Full throttle	4.538
90		4.538
	Over travel	
100		5.0
V _{ref} = 5.0(max.vtg)		

C) Designing consideration And force analysis:

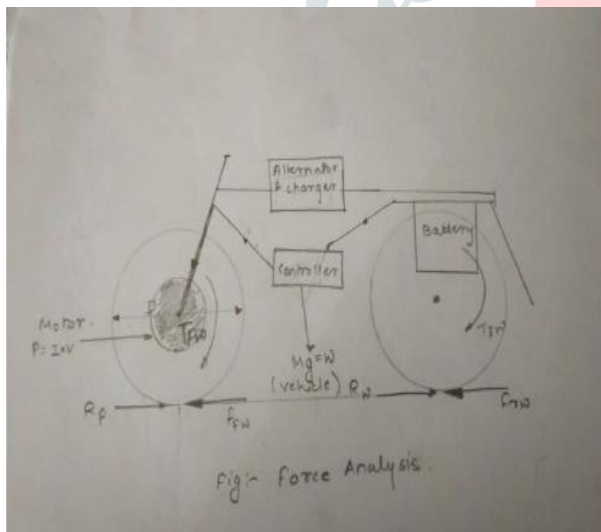


Figure 2: Force analysis diagram

- As our motive to drive vehicle from motor then our motive is to calculate speed on front wheel according to power generation by motor which is

Power (P) =Current (I) X Voltage (V)

- An as we know the relation between voltage and current in regards to electrical terms is directly proportional Whereas

Voltage(V) increases so the speed(N) will also increases.

- But we know that at two basic condition we have to calculate speed of vehicle

CASE 1: At where speed is zero where max torque is needed to initiate vehicle to motion where voltage on throttle sensor is low

CASE 2: At where speed is max and torque is low where voltage is max so speed will be high Then, total voltage according to our Prototype =no of battery X voltage of normal battery(12v) so the current will also fluctuate according to value of current .

- Dia of wheel =D (mm)
- Circumference of wheel =πD(mm)
- Then the weight of all loads=Total weight of two passengers + Weight of motor cycles + Other miscellaneous loads.(N)
- Force on a front wheel equal to force on a rear wheel Force (Ffw) = Force (Frw) = Frw/2 (N) nothing but load distribution.
- Then Reaction on both wheel Rfw = Rrw (According to fig) =0.2 X Rwr
- Then to calculate Torque on each wheel, Total Torque = Tfw + Trw
- Tfw = Rfw X (Diameter of wheel/2)(Nm)
- Then to calculate the Speed (N) $P = 2\pi NT/60$, where P=I X V

This is how we will get and acquire the speed on both the cases according to voltage variation.

PROBABLE OUTCOME

This will help in several ways listed below:

- As after 5 years there will lots of two wheeler vehicle will be second handed so we could assemble this system and provide a vehicle to optimizing condition.

2. Our systems will not going to produce any pollution as its secondary system is electrical propulsion system.
3. More important it will help consumers to reach nearest fuel stations at dry condition of vehicle and tackle so many dangerous situations.
4. As more futuristically we could make an embedded system which will be combination of controller and ECU (electronic control unit) which is very important part of every motorcycle nowadays.

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