

Smart Operating Control in Hybrid Cycle

N. Kavitha, Archana Bela, M. Somasekharreddy, A. Suresh, S. Kiran



Abstract: As we all know that transportation sector is extremely necessary, current generation all the vehicle are born-again to electrical vehicles it's the rapid climb in vehicle market conjointly hybrid vehicle conjointly came into the trade having the over one power. The hybrid vehicles work underneath each fuel power and electric power however is pricey and conjointly it's unable to attach to the tiny vehicle like bikes and bicycle, dominant of hybrid power. Therefore troublesome its unable connect for little vehicle attributable to this issue the good operative management designed "smart operative control in hybrid cycle". This project in the mainly designed for the medium transportation like two-wheelers, hybrid cycles, this in the main controllers the hybrid power base d on the load and distance to be traveled.

Key words: operative in good method, good operative management in hybrid cycle.

I. INTRODUCTION

More than one energy supply used for the cycle is termed hybrid cycle. There are many varieties of cycle in our place seen in day to day life as traditional cycle that individuals got to peddle, electrical cycle that uses power associate degreed electric bicycle that may solely.

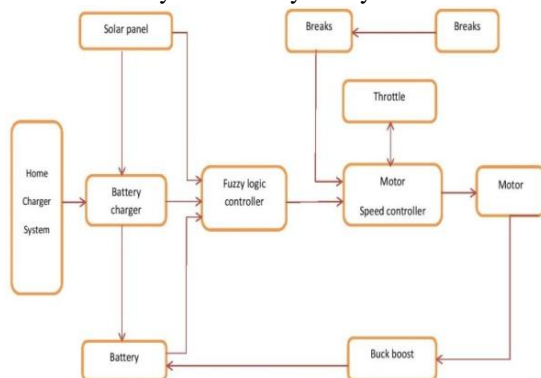


Fig.1. Diagram of SOCH

Be comfortable for an hour. They're many varieties of hybrid cycles however they run singly supply, "ex in solar cycle the solar battery ar used just for the charging however not for driving the motor,

Generator conjointly used for this just for charging". All the hybrid cycle are used for charging functions as a result of the comfortable power turn out by the solar and generator in unable to drive the motor. This project designed shown in Fig.1 for management the operation in good method supported the load the simultaneous operation of hybrid power choice of power supported the load it provides the simultaneous operation to deliver the continues power to the motor .when the no load time the battery get charged in 2 method solar and regenerator operation.

II. FUNCTIONING ACTIVITY

The diagram shown that operation of good operative management in hybrid cycle, the motor is directly connected to back wheel of the cycle to scale back the chain loss and length of the chain is reduced, solar battery are fastened in high of the pinnacle. Once the idle condition the solar charging the battery , smart operating devise is controlled the working operation between the load and source and maintaining the power scheduling during peak lad condition, the solar power is shearing the load with the battery because in the peak load the motor draws the heavy current that may cause discharges the battery power quickly due to that reason the smart operating control device is used to schedule power in optimum level. Two sets of battery are using in this when the motor is running the other set will be charging solar is power is charging the battery peak load time the solar power is connect parallel with operating battery when this operating battery is low other set will drive the motor, and low battery is charging this process takes place continuously.

III. COMPONENTS

a) PMDC Motor

The motor used in this is PMDC motor as we known that working of motor whenever current carrying conductor placed in magnetic field the rotational force will generate. One of the main reasons for using PMDC Motor this motor act as generator during down gradient of the hybrid cycle. In this motor the toque should be high Shaft torque of a DC motor is given as, fig.2. shown. $T = \text{output in watts} / (2\pi N/60)$.(where, N is speed) this motor is mainly used for the driving wheel directly from the controller, this motor is very small in size so that it is to install in the cycle. The weight of the motor also is light in weight.

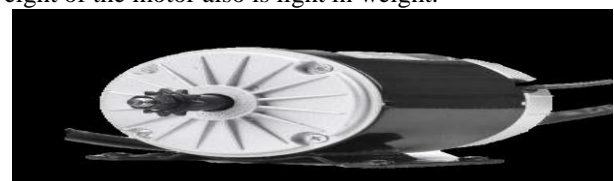


Fig.2. PMDC Motor

Revised Manuscript Received on February 28, 2020.

* Correspondence Author

N. Kavitha*, Assistant Professor, Department of electricaand electronic Engineering, Kuppam engineering college. A.P., India.

Archana Bela, Assistant Professor, Department of electrical and Eletronic Engineering, Kuppam engineering college, A.P., India.

M. Somasekharreddy, Assistant Professor, Department of electrical and Eletronic Engineering, Kuppam engineering college, A.P., India.

A. Suresh, Assistant Professor, Department of electrical and Eletronic Engineering, Kuppam engineering college, A.P., India.

S. Kiran, Assistant Professor, Department of electrical and Eletronic Engineering, Kuppam engineering college, A.P., India.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](http://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>

Table.1. Motor Specification

Load	Voltage	Current	Power	Torque
No lad	12-24V	3-6A	36-76W	2.07n-m
Full load	12-24V	10-13A	120-250W	7.957n-m



Fig.3.Throttle

a) THROTTLE

This electrical bicycle accelerator throttle is straightforward to use and nice for those who need to stay their original bar grip. Generally the throttle is employed on bikes that have a twist gear ever-changing system. Throttle that same it comes right down to personal alternative because the thumb throttle also can be used on a motorcycle shown in fig.2 that features a thumb gear ever-changing system. A "Throttle" refers to a technique of dominant the speed of associate degree engine or motor.



Fig.4.Solar Module

Table.2.Solar Specification

Parameter	Values
Rated Power	12W
O.C Voltage	21.6
S.C Current	0.66A
Full Voltage	17.6V
Rated Current	2A

b) FUZZY LOGIC CONTROL

In smart operating device is to control and power schedule based on the load, the Fuzzy logic control is used for the operation because of this fuzzy control used is in this because no mathematical operation and fast and accurate variable it as only true are false condition, reference power is set in fuzzy, in solar power is not continuously. During peak load the solar and battery is parallel operation reaming time this fuzzy schedule the optimal allocation of hybrid power. During Peak load time the current is sensed by the controller and it schedule the power according to the load current and reference current it also indicate the amount of power is consumed by solar power also battery.

c) SOLAR MODULE

Generally in this project used 12-24w solar module it need to connect with load and parallel with battery because the max current is drawn by the load it reduces the charge time of the battery so in order to reduce the discharge rate of the battery the solar module is connected in parallel with load .this panel are connected and placed over the head because of the safe and it useful in the summer.

Table.2.Solar Specification

Parameter	Values
Rated Power	12W
O.C Voltage	21.6
S.C Current	0.66A
Full Voltage	17.6V
Rated Current	2A

d) CHARGE CONTROLLER

In the hybrid cycle the charger are wont to charge the battery in rest place and within the running condition conjointly a number of the hybrid cycle unable to charge the battery within the running condition so this charger circuit is meant to charge in running condition conjointly this charge the battery by victimization the solar array and in re generator action, they are totally different variety of charging technique,

PWM (Pulse Width Modulated):— This is that the ancient kind charge controller, in the pulse are ever-changing supported shown in fig.4 the charge needed these are basically the business customary currently purpose are used.

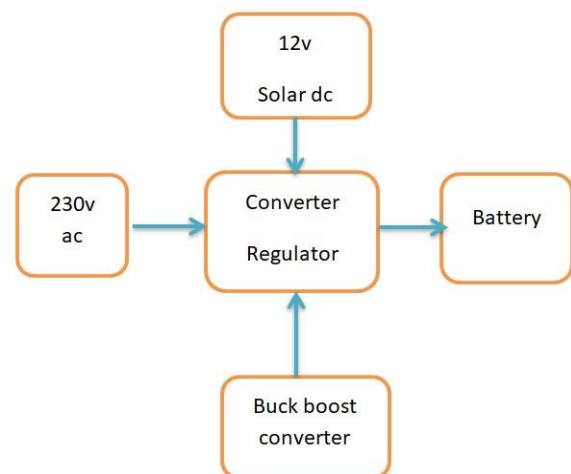


Fig.4.Charger Circuit

Maximum electric outlet chase (MPPT): The MPPT charge controller is that the sparkling solar of today's solar systems. These controllers actually establish the simplest operating voltage and electrical phenomenon of the solar array exhibit and match that with the electrical cell bank. the result is further 10-30% a lot of power out of your sun adjusted cluster versus a PWM controller.It's typically definitely worth the speculation for any solar electrical systems over two hundred watts.in this mx current will pass through the battery and charges quickly, now a days the charge should get fast it reduces the changing time if any emergency most the people are prefer for the speed charging technic only.

Features of Charge Controller:

- Protects the battery (12V) from over charging
- Reduces system maintenance and will increase battery period
- Auto charged indication
- _ Over voltage protection
- _ Less maintenance
- _ Up to 10A-40

Table.3. Charger Rating

Parameter	Ratings
Ac voltage	230v
Dc voltage	12-24v
Output current	5-10a
Output voltage	12-24v
Boost voltage	4-6v

e) MOTOR SPEED CONTROLLER

As the motor control utilized in the good operating control in hybrid cycle is to manage the speed of the motor for soft running of motor during this MOSFET are used for dominant of the motor, as we known that MOSFET gate supply is pulse by changing the pulse of the gate the out of the MOSFT will change automatically the MOSET are used different channels

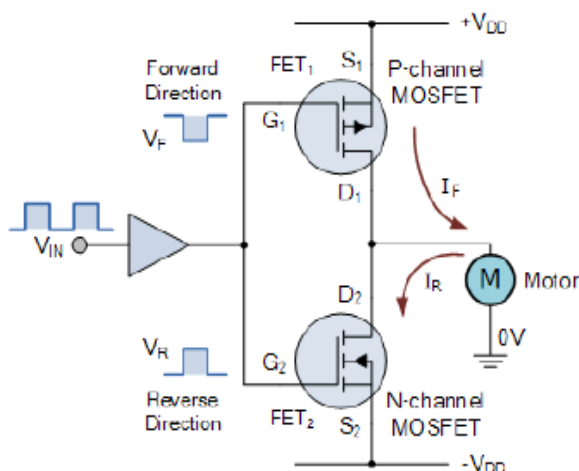


Fig.5.Working of MOSFET

But in some applications we have a tendency to need the utilization of P-channel enhancement-mode MOSFET Were the load is connected on to ground. During this instance the MOSFET switch is connected between the loads and also the positive provide rail (high-side switching) In a P-channel device the standard flow of drain current is within the negative direction therefore a negative gate-source voltage is applied to modify the semiconductor "ON". This is achieved as a result of the P-channel MOSFET is "upside down" with its supply terminal tied to the positive provide +VDD. Then once the switch goes LOW, the MOSFET turns "ON" and once the switch goes HIGH the MOSFET turns "OFF", This the other way up association of a P-channel sweetening mode MOSFET shown in fig.5 switch permits U.S. to attach it asynchronous with a N-channel sweetening mode MOSFET to supply to provide

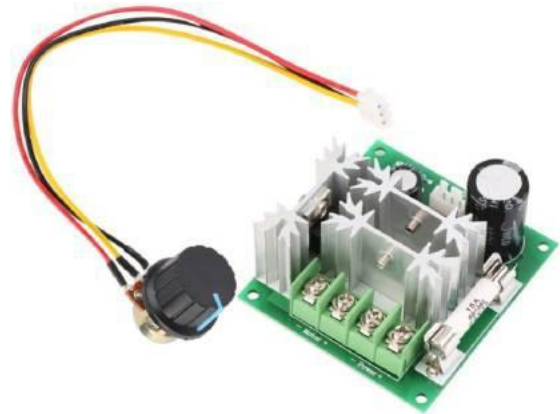


Fig.6.Speed Controller

Parameters	Rating
Max voltage	48v
Max power	1000w

a complementary or CMOS change device as shown across a twin supply. Complementary MOSFET Motor Controller The two MOSFETs are designed to supply to provide.Bi-directional switch from a twin supply with the motor connected between the common drain association and ground reference. Show in fig.6 Once the input is LOW the P-channel MOSFET is switched-on as its gate-source junction is negatively biased that the motor rotates in one direction. Then the P-channel MOSFET is employed to modify the positive provide to the motor for forward direction (high-side switching) whereas the N-channel MOSFET is employed to modify the negative provide to the motor for reverse direction (low-side switching).it is used in this project because of the controlling motor from the different speed range and also limit the starting current for the smooth running of the motor, the mosfet is used because with small gate pules high voltage can be controlled.

IV. OUTPUT AND DISCUSSION

Our hybrid bicycle total weight together with battery, motor and solar array is 30kg. Once battery is totally charged. Maximum travel distance at plain road is 15-30km.shown in fig.6 gamma hydroxybutyrate Wight will pull up to 75-100kg Hybrid bicycle will attain a most speed of twenty km/hour. Compared to already existing E bikes travel distance and most speed is tiny however considering value the value of price our hybrid bicycle is around 5500 Rupees and E-bikes cost is 30000 Rupees. Our hybrid bicycle value is cheaper than the presently, existing E-bikes. Hybrid bicycle power may be multiplied by replacement existing motor and battery to higher ratings as per required. And also maintenance point of view is so easy to repair the product at any place it don't require any special equipment for the services it available at all service point.in this doesn't require any additional chargers, normal charging and used also solar charging available in this the battery get charged in running condition aso.

Smart Operating Control In Hybrid Cycle



Fig.7. Final Product

Table.4. Final Output and Comparison

Parameter	Smart Operating Control In Hybrid Cycle	E Bike	Ordinary Bicycle
Max speed (km/h)	20-30km/h	25-30	5-10
Drivers pedaling requirement	Optional	No	Yes
Initial unit cost in Rupees	5500	30000	4000
Wight in kg	30	50	15
travelling distance (fully charged) in km	15-30km	70	-
energy used	Electrical and muscle power	Electrical	Muscle Power
noise(dB)	5-8	65-70	Noiseless
Battery life time	2-3 years	1-2 years	-
Cost per Km in Rupees	0.5-1	3.5	-
Battery capacity	7.5AH	10-20AH	-
Battery type	Lead acid	Li-Battery	-
Cost of the battery	500-600rs	5000-11000	-

V. ADVANTAGES

- Effective utilization of hybrid power and it provides long distance of same battery vary.
- The operational technology is straightforward and straightforward to work and maintenance.
- This technology will used for each high vary and little vary vehicles.

- This hybrid cycle are used for native transport.
- This device each amendment and discharge technology.
- No want of charge for a while and it conjointly charge in time period.

VI. DISADVANTAGES

- Price of Motor, battery and electrical device will increase with the burden of product.
- Device makes bulkily owing to the solar and battery.

VII. APPLICATIONS

- It accustomed management the hybrid vehicles in most effective approach.
- This will use for bicycles conjointly with less price.
- For kid's tiny hybrid bicycle is used as a kid's cycle.
- Used for native transport devices.

VIII. CONCLUSION

Smart in operation controller device area unit used for all hybrid cycle is modification of existing bicycle and driven by hybrid power. It's appropriate for each town and country roads, This bicycle is cheaper regarding value of 5500 rupees and less complicated in construction & is wide used for brief distance and native move regarding 15-30km particularly by faculty youngsters, faculty students, workplace staff, villagers, postmen etc. it's considerably appropriate for young, aged, physically challenged individuals and caters the requirement of economically poor category of society. It is operated throughout the year freed from value. The foremost vital feature of this bicycle is that it doesn't consume valuable fossil fuels thereby saving the money. Its eco- friendly & pollution free, because it doesn't have any emissions. Furthermore it's quiet and may be recharged with the adapter just in case of emergency. It is driven by manual pedaling just in case of any downside, it can be simply resolves desires less maintenance.

IX. FUTURE SCOPE

In gift project, good operational management in Hybrid cycle uses alternative energy and battery and human power equally and expeditiously united of the energy supply. In future battery less may also be used as a one of energy supply by inserting solar electrical converter at Hybrid cycle are often changed more and build it to use for physically disabled individuals. Even cycle are often digitalized by fitting indicators, advance sensors, alphanumeric display, Navigation system etc. Gear variation system may also be enforced to extend torsion and management speed. This technology can use for the heavy vehicle also for the feature because it does not require any special equipment.

REFERENCES

1. Darshil G. Kothari, Jaydip C. Patel, Bhavik R. Panchal "Hybrid Bicycle" 2014 IJEDR| Volume 2, Issue 1 | ISSN: 2321-9939
2. Vivek V Kumar¹, Karthik A, Ajmal Roshan, Akhil J Kumar, "Design and Implementation of Electric-Assisted Bicycle with Self Recharging Mechanism", Volume 3, Special Issue 5, July 2014, International Conference On Innovations & Advances in Science, Engineering And Technology [IC - IASET2014]



3. Mr. PrashantKadi, Mr.Shrirang Kulkarni, IJSRD - International Journal for research project & Development| Vol. 4, Issue 05, 2016 | ISSN (online): 2321-0613
4. Mr.PrashantKadi, Mr.Shrirang Kulkarni, IJSRD - International Journal for research project & Development| Vol. 4, Issue 05, 2016 | ISSN (online): 2321-0613

AUTHORS PROFILE



N.Kavitha, Assistant professor

As I received the B.Tech degree from VITS proddatur in 2017 and also M.Tech degree from MITS in madanapalli in the filed of electrical and electronics engineering. Now iam working as assistant professor in kuppam engineering college in department of electricaand electronic Engingeering . I am interested in research and development in renewable energy and power quality.and I done project on the hybrid power controle so that we are planned to do hybrid vechicle so the we are done a project run the vechicle in hybrid power and controle the ower in the optpal level.



Archana Bela , Assistant professor

As I received the B.Tech degree from SVP CET in 2011 and also M.Tech degree from Kuppam engineering college,in the kuppam in 2018 in the filed of electrical and electronics engineering. Now I am working as assistant professor in the kuppam engineering college in department of electricaland Eletronic Enginering . I am interested in research and development in power electronics



M.Somasekharreddy

As I completed diploma in 2017 in electricals in kolar gold field and also perusing b.tech in kuppam engineering college as electrical and electronics engineering 2020 this is first paper publication on smart operating control in hybrid cycles also worked on the same project for past one year because we are using bicycle for local travel so that we got an idea to do e-cycle but is already in exist but this product is costly and cannot unable to by normal people so we are designed for low cost. And we also work on iot based smart energy meter this project based on the two-way communication between seller and consumer for this we got select for startup India program in 2018, and I was very must interested in power system and electrical vehicle research and development.



A. Suresh

as I completed my intermediate in 2015 on state board and also pursuing b.tech in kuppam engineering college as electrical and electronics engineering 2020 this is first paper publication in the Scopus in on smart operating control in hybrid cycles also worked on the same project for past one year because we are using bicycle for local travel.we are from farmer background and I was very interested to do reaserch and development projects and it is unable to do because of financial crisis, now we got the opertunity and also we are started a new project which is modifying the problems on e-bikes and we are trying to regenerate energy from existing source.



S. Kiran

as I completed intermediate in 2015 on state board and also pursuing b.tech in kuppam engineering college as electrical and electronics engineering 2020 this is first paper publication in the on smart operating control in hybrid cycles iam very must interested in power electronic because from my child wood it self interested in the electrical power so that I am taken electrical engineering,I am interested in for resurch and development inn the power electronics,energy resources and technologyand iam looking for job in the field of power electronic resurch and development .