DESIGN & ANALYSIS OF HYBRID ELECTRIC VEHICLE FOR REAL-TIME APPLICATIONS

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ABSTRACT-Most of the electric vehicles require frequent charging and requires more time for charging. To avoid this charging time and to avoid the usage of battery in the electric vehicle the hybrid electric vehicle has been designed. The hybrid electric vehicle consist of the dynamo and the driving motor which are the main component for the hybrid electric vehicle. This circuit combination helps us to avoid the usage of battery in the normal electric vehicle. The dynamo supplies the necessary voltage to the electric bike motor which drives the electric bike. The generated energy is the free energy. The generated free energy is give to the electric bike by means of the step-down transformer.

In addition to this a smart helmet is also designed. This smart helmet is designed inorder to reduce the accidents. This smart helmet is designed in such a way that the electric bike will start only if the person wears the smart helmet,if he removes the helmet the vehicle off's itself. In this the left and right indicators are also fixed for indication. This operates when the electric bikes indicator is operated manually.

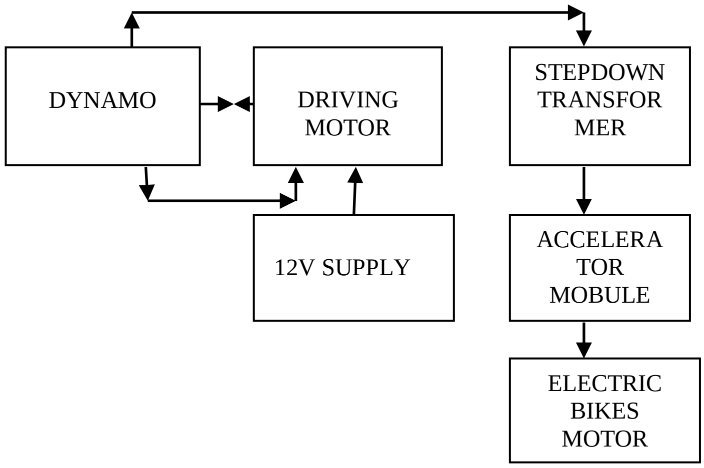
II. LITERATURE SURVEY

1.Jung-Hoon Ahn proposed: High Efficiency Adaptive-Current Charging Strategy for Electric-Vehicles Considering Variation of Internal Resistance of Lithium-ion Battery- IEEE, 2018 - In this existing paper, he had presented a battery charging technique to reduce Lithium-ion charging losses battery for electric vehicles. The proposed charging strategy uses an adaptive current profile based on variations in internal resistance of the battery as a function of charging status and charging rate. An evolutionary algorithm, which is a type of stochastic approach, is applied to address the problem of finding the optimum current set for the proposed strategy. A strategy for choosing the optimum number of charge intervals to achieve a balance between loss reduction and computational burden is also provided. Experimental results obtained using 34-Ah lithium-nickel-manganese-cobaltoxide battery cells have proved that the proposed charging strategy decreases charging loss of the battery cell by 40.1% compared with a conventional constant-current charging strategy. In addition, a 3.3 kW on-board charger prototype was constructed to investigate the total loss reduction in an electric-vehicle charging system which includes a 12 kWh battery pack.

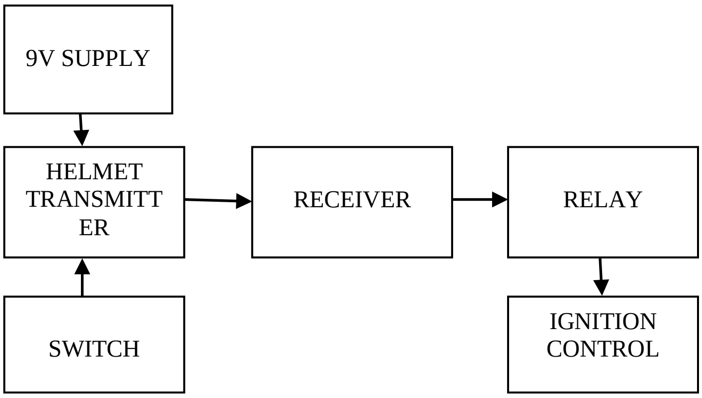
2. Seungmin Jeong, Young Jae Jang, Dongsuk Kum and Min Seok Lee proposed: Electric Vehicle Charging Automation: Is a Smaller Battery Ideal for Electric Vehicles Loading Wireless?– IEEE,2018- In this existing paper they have presented Dynamic wireless charging (DWC) is anemerging technology that enables the batteries of electric vehicles (EVs)tocharge automatically while the vehicles are in motion. The DWC-EV system addresses the challenges inherent in battery technology, such as the short driving range, long recharging time, and high price. Compared with conventional plugin EVs, the DWC-EV can charge a battery more frequently because it can be done while the EV is in motion from the charging infrastructure installed on the road. In this paper, we analyze how this frequent-charging characteristic of DWC-EV can affect the battery lifetime in the DWC-EV. We first introduce a mathematical model to evaluate the economic cost of the DWCEV for a given battery size. A battery degradation model is incorporated to account for the quantitative relationship between recharge infrastructure installation and battery life extension. Then we use the model to examine how the cost to the economy varies with the battery size. Our preliminary findings provide insight into the connection between charging infrastructure and battery life.

III. BLOCK DIAGRAM

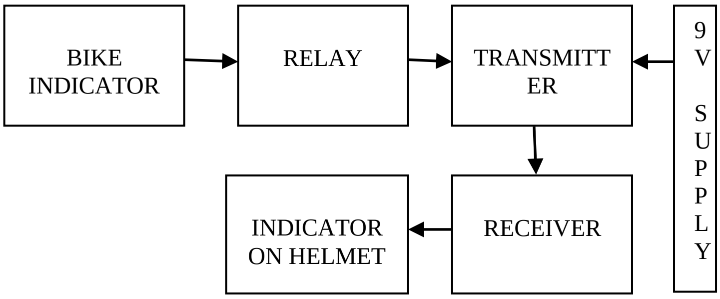
1. ELECTRIC BIKE CONTROL



2. HELMET CONTROL



3. INDICATOR CONTROL

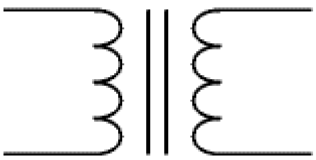


IV. COMPONENT DESCRIPTION

4.1 POWER SUPPLY

Power supply is a reference to an electric power source. A device or system that supplies an output charge or group of loads with electrical or other forms of energy is called a power supply unit or PSU. The term is most widely used for the supply of electrical energy, less often for mechanical supplies and seldom for others.Electronic power supplies can be widely divided into linear and switching power supplies. Linear supply is a relatively simple design that becomes increasingly voluminous and heavy for high-current devices; poor efficiency can result in voltage control in a linear supply.

4.2 TRANSFORMER



With no power loss, transformers convert AC electricity from one voltage to another. Transformers only work with AC, and this is one of the reasons why electricity from the mains is AC. Step-up transformers raise voltage, and step-down transformers lower voltage. Most power supplies use a step-down transformer to reduce to a safer low voltage the hazardously high voltage (230V in the UK). The input coil is called principal, and the output coil is secondary.There is no electrical connection between the two coils; instead they are linked to each other by an alternating magnetic field created in the transformer's soft-iron core. The two lines in the center of the symbol represent the origin of the circuit.Transformers consume a very small amount of power so power out is (almost) equal to the power in. Remember that current rises as voltage is stepped down.

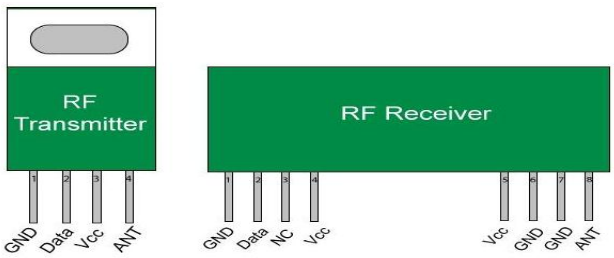
4.3 ACCELERATOR MODULE

The throttle mode is identical to the workings of a motorcycle or scooter. The motor provides power when the throttle is engaged, and propels you and the bike forward.You can pedal or just kickback a throttle and enjoy a "free" ride! Most throttles can be fine tuned between low and full power, like a volume dial.

4.4 RF TRANSMITTER & RECIEVER

In general, there are two main restrictions for the wireless network designer: it must work over a certain distance and transmit a certain amount of information within a data limit.The RF modules are extremely small in size and have a wide range of operating voltages, i.e. 3V to 12V.

The RF modules are basically 433 MHz RF transmitter / receiver modules. The transmitter draws no power while transmitting logic zero thus fully suppressing the carrier frequency and thus consumes significantly low power during battery service. When logic is sent, the carrier is fully operated at about 4.5mA with a power supply of 3volts. The data is transmitted serially from the transmitter which the tuned receiver receives. Two microcontrollers are duly interfaced with the transmitter and receiver for data transfer.



4.5 RELAY

A relay is a device which is operated electrically. Current flowing through the relay's coil produces a magnetic field that draws a lever and switches contacts with the switch. The coil current can be turned on or off so that relays have two switch positions and most have double throw switch contacts as shown in the diagram.

4.6 IGNITION CONTROL

An ignition system generates a spark or heats an electrode to a high temperature to ignite a fuel-air mixture in spark ignition internal combustion engines, oil-fired and gas-fired boilers, rocket engines, etc. In petrol (gasoline) road vehicles such as cars and motorcycles, the widest specification for internal combustion engines for spark ignition is in.Compression ignition Diesel engines ignite the mixture of fuel-air by compression gas, and do not need a spark. They usually have glow plugs which preheat the combustion chamber to allow cold weather to start. Other engines may use a flame for ignition, or a heated tube. Although this has been popular for very early engines it is uncommon now.

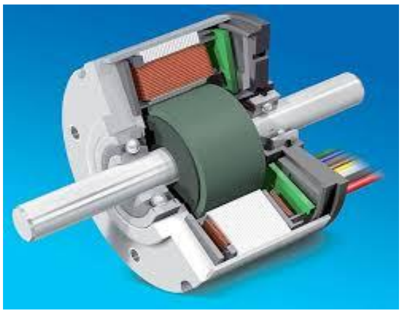
4.7 DYNAMO

The electric dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation through Faraday's induction law and Lenz's law into a pulsing direct electric current. A dynamo machine consists of a stationary structure, called the stator, that provides a constant magnetic field, and a collection of rotating windings, called the armature that turns within that field.Because of Faraday 's induction law, the wire movement within the magnetic field creates an electromotive force that pushes the metal electrons, creating an electrical current in the wire. On small machines one or more permanent magnets may provide the constant magnetic fieldLarger machines have a constant magnetic field provided by one or more electromagnets, commonly referred to as field spins.

4.8 E'BIKES MOTOR

Brushless DC electric motors (BLDC motors or BL motors), also known as electronically switched motors (ECM or EC motors) and synchronous DC motors, are synchronous motors powered by direct current (DC) electricity through an inverter or switching power supply that generates electricity in the form of alternating current (AC) to drive the motor through a closed loop controller at each stage..The controller provides the motor windings with pulses of current which control the motor speed and torque.

The construction of a brushless motor system is typically similar to a permanent magnet synchronous motor (PMSM), but may also be a switched reluctance motor or motor induction (asynchronous).



4.9 Driving motor

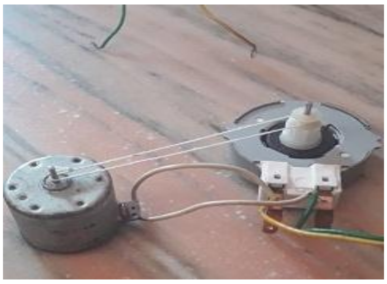
In 1832 British scientist William Sturgeon invented the first electric DC commutator capable of turning machinery. Following Sturgeon 's work, the American inventor Thomas Davenport built a commutator-type direct-current electric motor which he patented in 1837.The engines were running at up to 600 revolutions per minute, and powered machine tools and a press. The engines were commercially unsuccessful and Davenport bankrupted, due to the high cost of primary battery power. Sturgeon was followed by several inventors in the development of DC motors, but all encountered the same battery cost problems. Since there was no electricity distribution network operating at the time, there was no realistic commercial market emerging for these engines.

In May 1834 Prussian Moritz von Jacobi created the first real rotating electric motor after many more or less successful attempts with relatively weak rotating and reciprocating apparatus. It had developed remarkable mechanical power output. His engine set a world record, improved four years later by Jacobi in September 1838.

V. RESULT AND CONCLUSION

In this paper we presented the hybrid electric vehicle. hybrid electric vehicle has been designed to avoid the usage of batteries on the normal electric bike. The proposed system based on the dynamo that generates the free energy. In addition the smart helmet has also been designed which doesnot allow the bike to start if the person is not wearing the smart helmet.

The hardware module of hybrid electric vehicle is shown in the figure.



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