

Energy Efficient system

Aravindan Anbarasu

ECE-Department, Kumaraguru College of
Technology, Coimbatore, INDIA.

Email: a.aravind1136@gmail.com

ABSTRACT: *Nowadays, most of the developing countries is facing a great power crisis, which hinders their development. To meet the power requirement in these developing countries, the concept "regenerative power from manual/automatic transmission" comes into action, which ensures that the kinetic energy wasted during the gear shifts can be effectively used in generating power, thus powering the needs of the car electronic systems and if the power generated is more, then it is stored in a separate battery, such that it can be used to power devices in home - a concept called Vehicle to Home Power Transfer System, thus opening a door for effective conversion and utilization of wasted energy in automobiles. The Overall Control is carried with the help of microcontroller, fly wheel, alternator, and gear system.*

KEYWORDS: *Fly Wheel, Alternator, "AT89s51 microcontroller", Gear System.*

I. INTRODUCTION

Generally energy can be neither created nor destroyed but it can be converted from one form of energy to another form of energy. In this system the kinetic energy which is wasted during the gear shifts i.e. during the manual/automatic transmission can be converted to electrical energy. Thus Power can be effectively generated thereby opening a door for effective conversion and utilization of energy.

II. BASIC PRINCIPLE AND NECESSITY

It's a simple electromechanical device used to convert rotational energy into electrical energy. When a vehi-

cle is running on a high gear, and suddenly for some reason it shifts the gear down to come to a lower speed, in that instance the kinetic energy possessed by the vehicle when it was in a high gear is lost when it shifts down to a lower gear. So here this device is implemented to use the kinetic energy lost between the gear shifts and convert it to equivalent electrical energy.

III. OVERALL OPERATION

The setup consists of a flywheel connected with an alternator. A microcontroller with a motor and relay is used to attach this setup to the gear system. When the vehicle is moving in a high speed i.e., the speed of vehicle exceeds 60kmph which is detected by the microcontroller and it makes the flywheel connected with an alternator to attach itself to the high gear fork. And when the vehicle is moving in a low speed i.e., the speed of the vehicle is less than 60kmph (for example 30kmph), the microcontroller makes the flywheel connected with an alternator to detach itself from the high gear fork with the help of motor and relay. The technique behind this process is that when the setup of flywheel with alternator is attached to the high gear fork, the flywheel rotates along with the speed of that gear and when the car shifts to a lower gear, the setup is detached from the high gear fork and continues to rotate at a speed when the car was in a higher gear for some time. If the flywheel attached with the alternator setup doesn't get detached, it rotates at low gear speed resulting in the wastage of kinetic energy. The flywheel attachment and detachment is done with the help of a microcontroller interfaced with a motor. As the flywheel rotates the alternator produces AC, which is converted to DC by a rectifier. This DC is used to charge two sets of battery, one for the car and one for the home purpose. If the car battery has sufficient charge and does not need charging from this device, then we can switch it to a mode where it charges only the battery for the home usage, where a concept called Vehicle to Home power transfer system is implemented as shown in Fig.1,

Fig. 2: Pin configuration

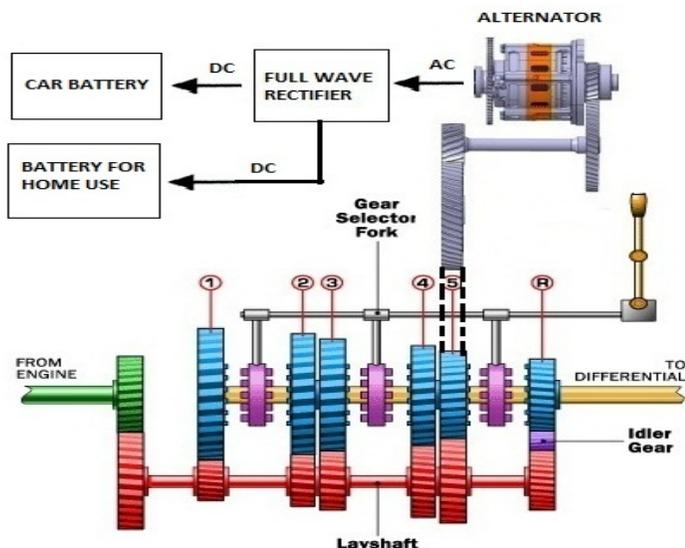
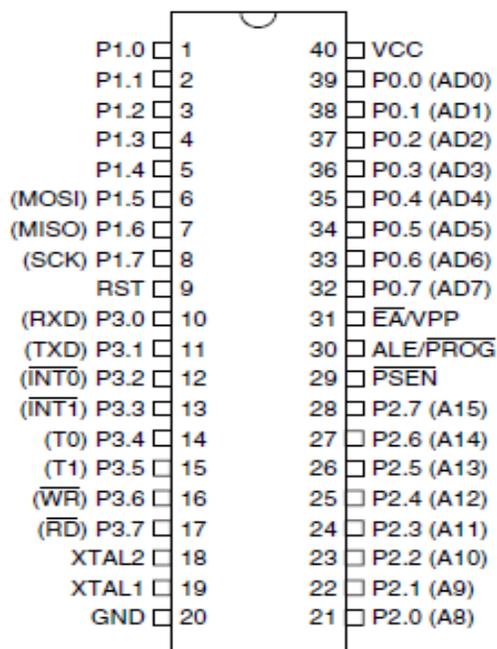


Fig. 1: Efficient Energy System

IV. MICROCONTROLLER INTERFACED WITH DC MOTOR

The microcontroller used here is AT89s51. It has 4 ports and 40 pins. The pin configuration of AT89s51 is shown in Fig.2,



AT89s51 is a low power, high performance CMOS 8bit microcontroller with 4k bytes of in-system programmable flash memory. The microcontroller is interfaced with the DC motor using one of the ports. The flywheel is attached and detached to the gear fork with the help of the DC motor interfaced with the microcontroller. The motor is made to run in forward /reverse i.e., attachment /detachment with the help of relay.

V. DC MOTOR FORWARD/REVERSE CONTROL WITH RELAY

This circuit is designed to control the motor in the forward and reverse direction. It consists of two relays named as relay1, relay2. The relay ON and OFF is controlled by the pair of switching transistors. A Relay is nothing but electromagnetic switching device which consists of three pins. They are Common, Normally close (NC) and normally open (NO). The common pin of two relay is connected to positive and negative terminal of motor through snubber circuit respectively. The relays are connected in the collector terminal of the transistors Q2 and Q4. When high pulse signal is given to either base of the Q1 or Q3 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero signals is given to base of the Q2 or Q4 transistor. So the relay is turned OFF state. When low pulse is given to either base of transistor Q1 or Q3 transistor, the transistor is turned OFF. Now 12v is given to base of Q2 or Q4 transistor so the transistor is conducting and relay is turn ON. The NO and NC pins of two relays are interconnected so only one relay can be operated at a time. The series combination of resistor and capacitor is called as snubber circuit. When the relay is turn ON and turn OFF continuously, the back emf may fault the relays. So the back emf is grounded through the snubber circuit.

- When relay 1 is in the ON state and relay 2 is in the OFF state, the motor is running in the forward direction.

- When relay 2 is in the ON state and relay 1 is in the OFF state, the motor is running in the reverse direction.

The circuit diagram for this section is shown in Fig.3,

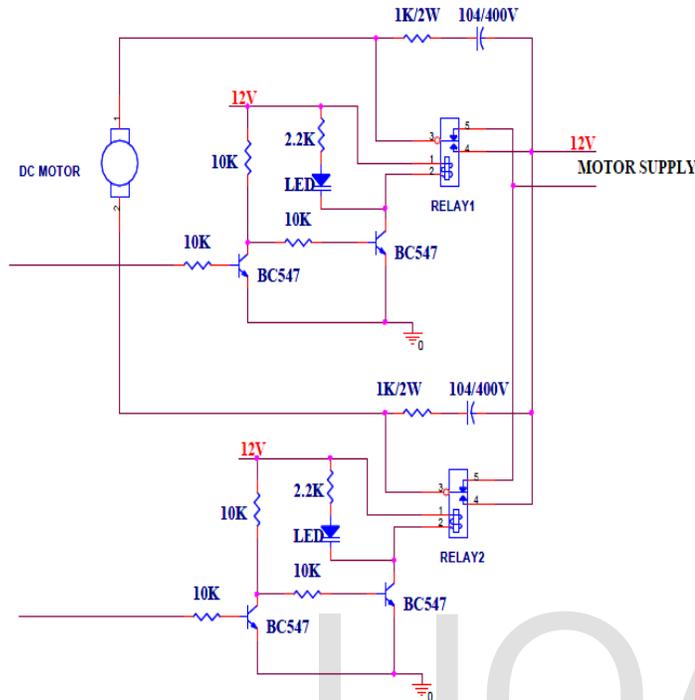


Fig. 3: DC motor forward/reverse control with relay circuit

VI.FULL WAVE RECTIFIER

Full wave rectifier circuit is the one which converts the alternating current to direct current. In a **Full-wave rectifier** circuit two diodes are now used, together with a transformer whose secondary winding is split equally into two and has a common centre tapped connection, (C). Now each diode conducts in turn when its Anode terminal is positive with respect to the centre point C . The circuit consists of two Half-wave rectifiers connected to a single load resistance with each diode taking it in turn to supply current to the load. When point A is positive with respect to point B, diode D₁ conducts in the forward direction as indicated by the arrows. When point B is positive (in the negative half of the cycle) with respect to point A, diode D₂ conducts in the forward direction and the current flowing through resistor R is in the same direction for both circuits. As the output voltage across the resistor R is the sum of the two waveforms, this type of

circuit is also known as a "bi-phase" circuit. The circuit diagram and waveform of a full-wave rectifier is shown in Fig.4,

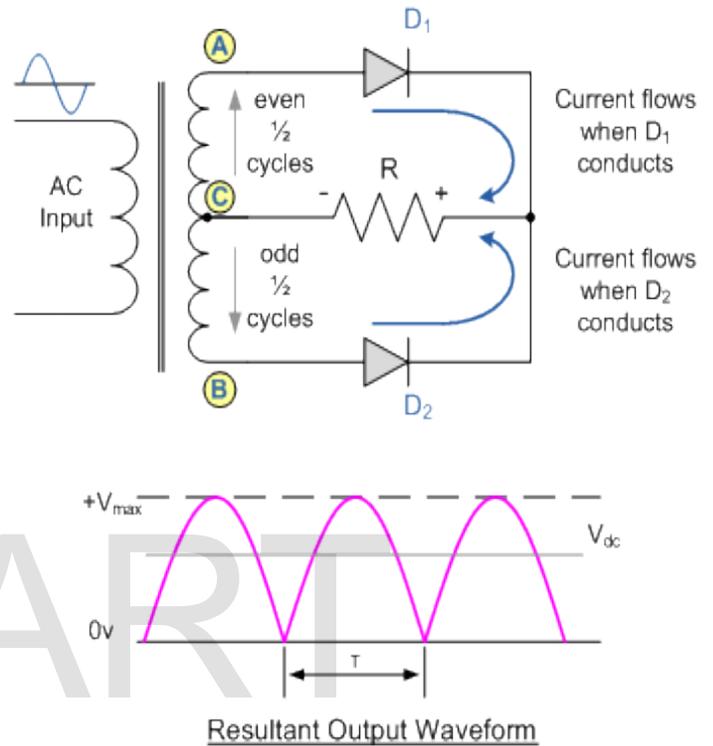


Fig. 4: Circuit diagram and resultant output waveform of full-wave rectifier

VI.CONCLUSION

Thus with the help of this energy efficient system one can meet the power crisis that is prevailing in most of the developing countries. It also helps to meet the power requirement of both the car and home to some extent. The battery which is being charged by this energy efficient system is portable and it can be removed, used for some purpose in home /some other place and it can be replaced back. This type of system can be installed to all type of geared vehicles.

VII.REFERENCE

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