REPORT: KERS kinetic energy recovery system

AIM:

To recharge the batteries of an electric car while it breaks, via the quadrant operation of the motor.

COMPONENTS REQUIERD:

1. MICROCONTROLLERS:

This is a little computer which acts as the brains behind the working of the car. That means that this is the real time feedback accumulator and forms the control system for logic actuation and supervisory control.

2. BATTERIES:

Standard power bank rated 2 amps and 5V for power system of the project.

3. MOTORS:

300 RPM geared motor for sufficient torque to avoid stalling will do the work.

4. RELAYS:

These are for switching the circuitry when the car is put in the regenerative action.

5. RF COMMUNICATION MODULE:

This is to establish a wireless communication between the remote and the car so that it can be controlled over a 30 meter range.

6. WIRES AND PLAIN PCBs:

The wires are for the connection purposes and PCB is for circuit designing purpose.

7. MOTOR DRIVER L293D:

Double H bridge driver to run the motors.

Also it will act as a electronic differential drive mechanism while the car is turning.

8. ULN2003A:

These are Darlington arrays for relay actuation and switching purpose. Generally it’s used as a stepper motor driver.

9. CAPACITORS:

These are to stabilize the power supply and reduce the noise interference in the circuit.

10. INDUCTOR:

This is connected to the VCC of the microcontroller and minimizes glitches in the power supply.

11. BIASING RESISTORS AND LEDs:

These are for various signal indication and feedbacks.

12. JOYSTICK SWITCHES:

Analog switches for achieving variable acceleration in the car.

13. LINEAR POTENTIOMETERs:

These are for calibration of the ADC converted power for balance charging feedback purpose.

14. SERVO MOTORS:

These motor will change the direction of the front wheels which will allow the car to take turns.

15. WHEELS AND CHASSIS:

These will form the main support and drive mechanism of the car.

16. IC 7805:

It is a voltage regulator IC which will chop the voltages above 5 volts to exact 5 volts; this is required for balance charging purposes,

17. USBASP PROGRAMMER:

This is a microcontroller programmer which actually enters the complied hex code in the microcontroller and programs it via a SPI (serial peripheral interface) module. This eliminates the double conversion at RS232 standards for microcontroller programming.

18. PUSH BUTTONS:

These are added for restarting and switching purposes.

HOW THE SYSTEM WORKS:

This project is divided into three sub projects which after debugging can be integrated into a single system which can not only function properly but the codependency of the generated parameters will give more controllability over the system.

The project is divided as under following parts:

1. Communication system.

2. KERS actuation, feedback control and power system.

3. Car handling and control.

WORKING:

* Car accelerates and moves forward as per the operation of the operator.
* When the breaks are applied microcontroller switches the circuitry of the motors such that regenerative action of the motor will render it to work as a dynamo.
* The back EMF generated by the wheels coupled to the motors will cause the breaking effect, hence decelerating the car.
* When the regeneration is taking place the balance charger will charge the individual batteries and will cut off the battery supply when the speed is reduced down to a value that the generated EMF is not able to charge the bank.