AUTOMATION OF POWER ADMINISTRATION & SELF ENERGIZED SYSTEM OF AN EV CAR

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***Abstract*-The main limitation in electrical vehicle is the charging time is very high according to efficiency of battery. There are many advantages of slow charging of batteries like no heat the battery while charging, efficiency is very high, life of battery is also good etc. There are many disadvantages for fast charging of batteries like heat the battery, deficiency is very low, life of battery is also going down slowly, battery terminals life goes down, the chemicals in batteries goes decreasing level slowly, outer layer of battery I.e. outer body's mechanical strength goes down due to heat while fast charging etc. Meri disadvantages is here. There are many problems in charging and discharging of batteries and their utilization so we thank about energy conservation techniques used in battery charging and their utilization.**

In this project we study about energy conservation techniques in utilization of battery power or energy and also energy conservation in battery charging.

You think about why conservation is necessary in batteries because battery charge with charging ports when required. In electrical vehicles auxiliary loads is very important like electronics display to give information about speed, charging level etc. suppose with think about these axillary loads run with self-generation of electrical vehicles.

Keywords: **Self-Energized, Power Management, Auto Switching, Auto Charging, Smart Control.**

I. INTRODUCTION

Today, we have already known the invention of an electric vehicle is very innovative. There are many companies to manufacture electric vehicles in different designs like external body design, internal design, motor design, and wiring design, and many functions are integrated into it. Many companies to try the how long back up the electrical batteries to run the electrical vehicle. Many research centers to testing the different types of batteries used in an electrical vehicle like lead acid batteries lithium-ion batteries etc.

The main limitation of an electric vehicle is the charging time is very high according to the efficiency of the battery. There are many advantages of slow charging of batteries like no heat in the battery while charging, efficiency is very high, the life of the battery is also good, etc. There are many disadvantages to fast charging of batteries heats the battery, deficiency is very low, and the life of the battery is also going down slowly, For battery management, there is the need for a multitude of data, like discharge curves in different conditions, temperature, voltage and current and when the battery reaches an unsafe operating interval as defined by the manufacturer then it needs to be disconnected as a protection mechanism, as safety is one of the main concerns of manufacturers for liability reasons. battery terminals life goes down, the chemicals in batteries goes decreasing level slowly, the outer layer of the battery I.e. outer body's mechanical strength goes down due to heat while fast charging, etc. many disadvantages are here. There are many problems in charging and discharging batteries and their utilization so we thank about energy conservation techniques used in battery charging and their utilization.

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II.PROJECT OBJECTIVES AND SCOPE OF PROJECT.

To prevent accelerated battery deterioration by managing the heat generated by its components so that it operates continuously under optimum temperature conditions

power optimization is high

due to of dual system of battery don't need any risk of failure batteries.

Travelling without any risk.

System control with dual batteries is simple.

Starting torque gives good form motors.

This future scope is most used for constant loading like goods.

In constant speed, no any need of charging.

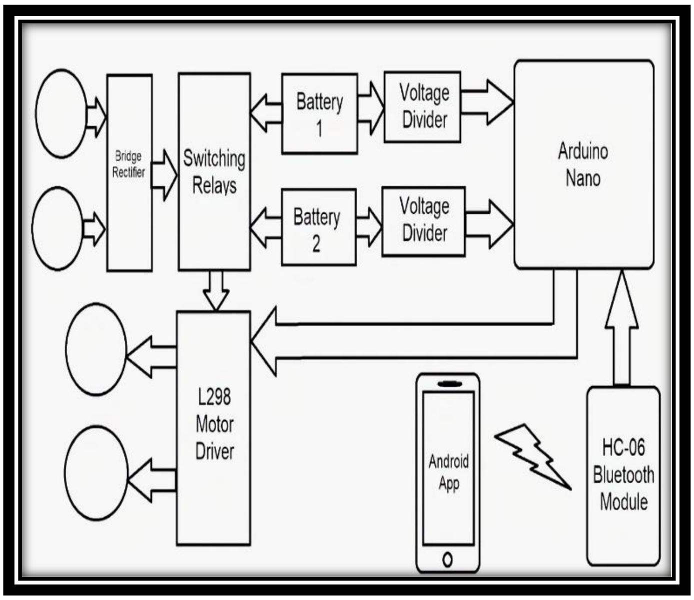
Tractive efforts are less due to position of dual battery system.

To travel long distance with constant speed gives high efficiency.

The EV industry in India can create some 10 million or 1 crore direct jobs and 50 million or 5 crore indirect jobs by 2030, according to estimates by the Ministry of Skill Development and Entrepreneurship.

The future of electric vehicles global market is expanding at a CAGR of 21.7%, which is expected to continue. Growth from 8.1 million units is anticipated to reach 39.21 million by 2030. Multiple factors, including worries about pollution, are driving this rapid expansion

III. BLOCK DIAGRAM AND CIRCUIT DIAGRAM



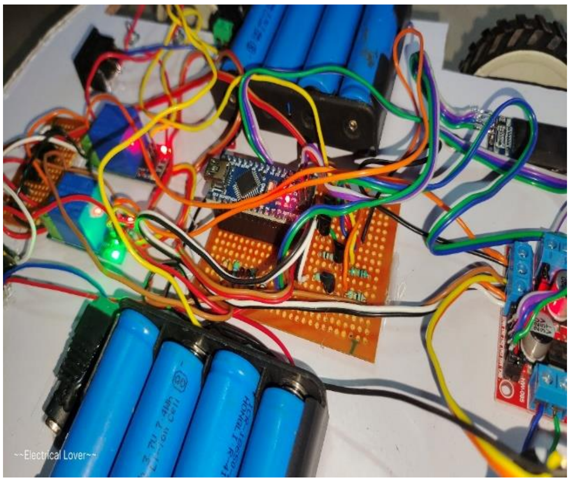
IV. CONSTRUCTION

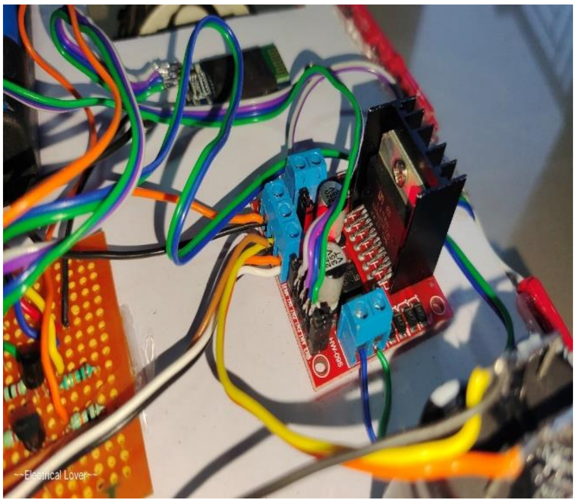
Has shown in the above figure, the battery management system includes a self-energized system for EVs. There are two battery systems used one is the battery system first and another is the battery system second.

From the battery system, the second connection is outgoing from this battery system like switching and filters management, and from switching and filters to electrical driving motors also connections are outgoing from the battery system second is the miscellaneous load which is headlights, horns, and miscellaneous lighting system.

Also, dc generators are attached to the back Wheels of the electrical car and generated energy or generated direct current going to the constant voltage controller and from this controller to the second battery system.

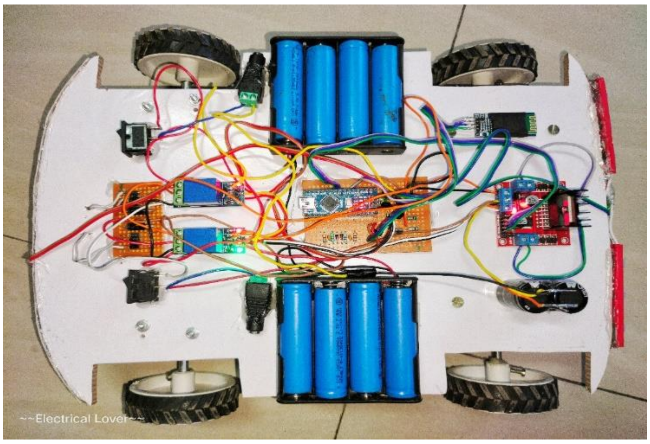
The charging port or the external charging port is attached to the first battery system from its switching and filters are attached to going motor driven





V. WORKING

Now we talking about source or energy source is used in the system there are two energy sources is used first one is battery system 1 and another is battery system second.

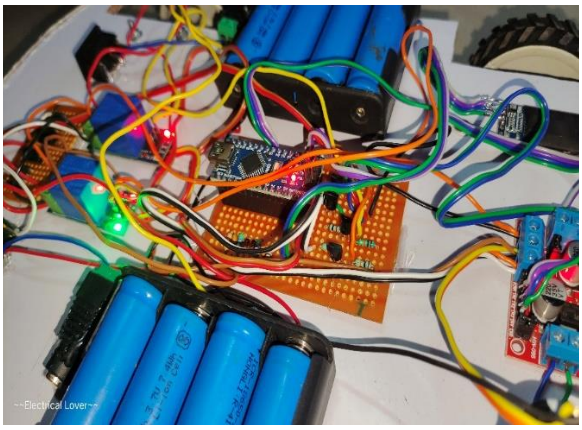


From battery system 1 we connect the switching and filters because when battery system 1 to deliver the power to motor harmonics is produced if we connect directly to battery to motor so we think to control the power of battery from battery system 1 is very necessary before motor driving system.

Battery system first is only used for to driving the motors or to driving the electrical car no any miscellaneous load is have on battery system first.

In battery system second we attached the system miscellaneous load like horns, night headlights, interior headlights etc. loaded in battery system second.

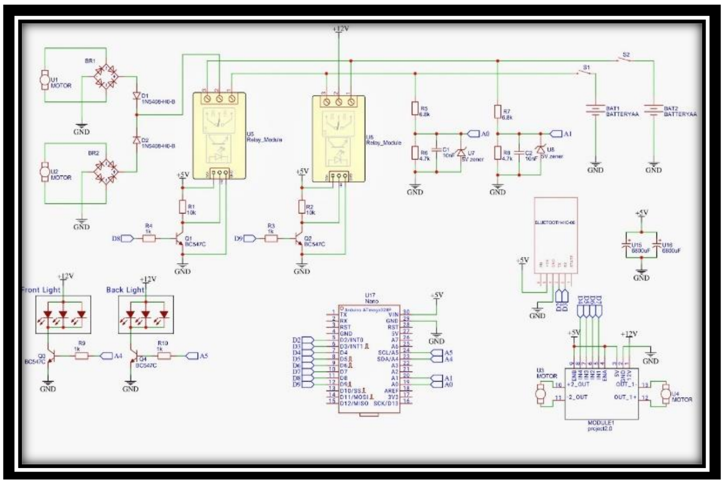
Secondly we talking about charging system of batteries. In this system there are two types of charging system is provided one is charge from external port and another is self-charging system while running condition.



In external port recharge the battery system 1 from public charging system otherwise home charging system otherwise parking facility charging. Another charging system is self-charging system while running condition is when vehicle is running condition according to their DC generator are attached in back wheels so to generate the energy according to Faraday's law to produce the electrical energy that generated energy is accepted to constant voltage controller because in this controller to maintain the constant

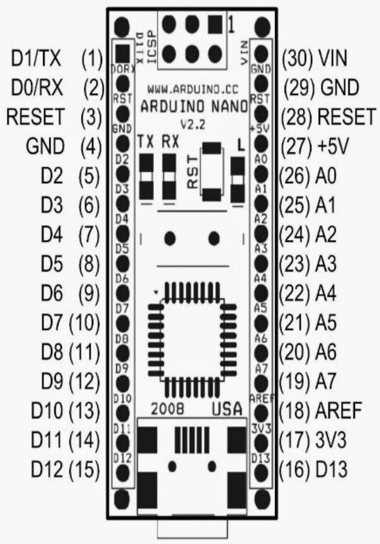
voltage from fluctuating voltage and from this controller to battery system second charge through self-charging system.
Suppose when battery system one is discharged due to of running the vehicle we easily shifted run on battery system second and battery system one is shifted to self-charging mode and vice versa.

VI. CIRCUIT DIAGRAM



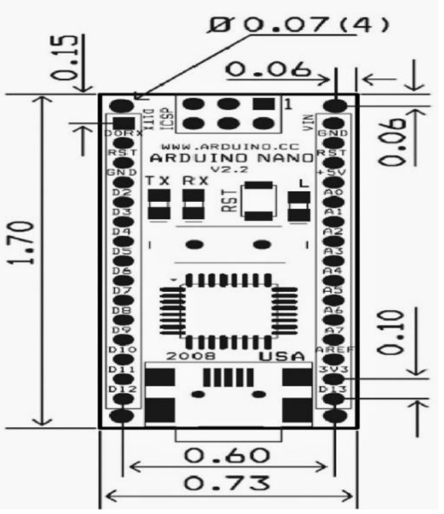
VII. SYSTEM DESIGN AND COMPONENTS USED

Arduino Nano Pin Layout

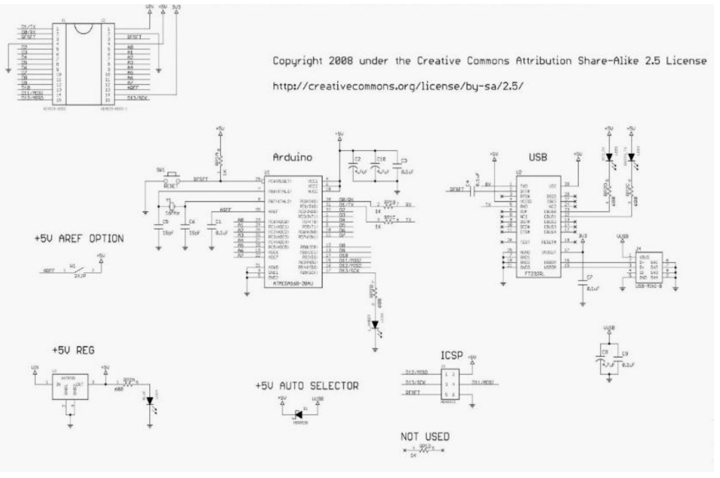


Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output (from FTDI)
18	AREF	Input	ADC reference
19-26	A7-A0	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

Arduino Nano Mechanical Drawing



Arduino Nano Schematic



Arduino Nano

Over view

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. The Nano was designed and is being produced by Gravitas.

Specifications:
Microcontroller: Atmel ATmega168 or ATmega328
Operating Voltage (logic level): 5 V
Input Voltage (recommended): 7-12 V
Input Voltage (limits): 6-20 V
Digital I/O Pins: 14 (of which 6 provide PWM output)
Analog Input Pins: 8
DC Current per I/O Pin: 40 mA
Flash Memory: 16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader
SRAM: 1 KB (ATmega168) or 2 KB (ATmega328)
EEPROM: 512 bytes (ATmega168) or 1 KB (ATmega328)
Clock Speed: 16 MHz
Dimensions: 0.73" x 1.70"

Power

The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source. The FTDI FT232RL chip on the Nano is only powered if the board is being powered over USB. As a result, when running on external (non-USB) power, the 3.3V output (which is supplied by the FTDI chip) is not available and the RX and TX LEDs will flicker if digital pins 0 or 1 are high.

Memory

The ATmega168 has 16 KB of flash memory for storing code (of which 2 KB is used for the bootloader); the ATmega328 has 32 KB, (also with 2 KB used for the bootloader). The ATmega168 has 1 KB of SRAM and 512 bytes of EEPROM (which can be read and written with the EEPROM library); the ATmega328 has 2 KB of SRAM and 1 KB of EEPROM.

Input and Output

Each of the 14 digital pins on the Nano can be used as an input or output, using pin Mode (), digital Write (), and digital Read () functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip. **External Interrupts**: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attach Interrupt () function for details.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analog Write () function. **SPI**: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.

LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Nano has 8 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default, they measure from ground to 5 volts, though is it possible to change the upper end of their range using the analog Reference () function. Additionally, some pins have specialized functionality:

I 2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wire library (documentation on the Wiring website). There are a couple of other pins on the board: **AREF**. Reference voltage for the analog inputs. Used with analog Reference ().

Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board. See also the mapping between Arduino pins and ATmega168 ports.

Communication

The Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega168 and ATmega328 provide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Nano's digital pins. The ATmega168 and ATmega328 also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. To use the SPI communication, please see the ATmega168 or ATmega328 datasheet.

Programming

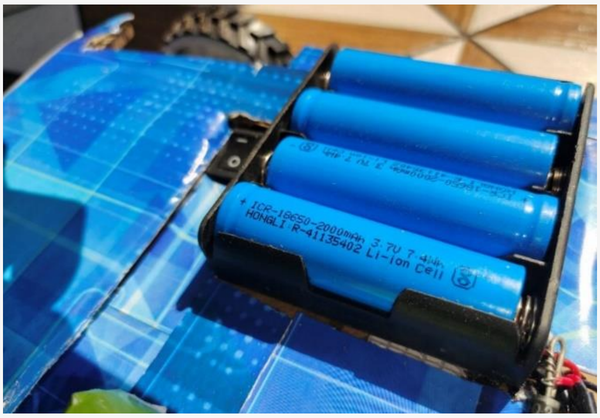
The Arduino Nano can be programmed with the Arduino software. Select "Arduino Decimal, Duemilanove, or Nano w/ ATmega168" or "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega168 or ATmega328 on the Arduino Nano comes preboned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details.

Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Nano is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the FT232RL is connected to the reset line of the ATmega168 or ATmega328 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Nano is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Nano. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

VIII. lithium-ion battery

The energy density of lithium-ion is typically twice that of the standard nickel-cadmium. There is potential for higher energy densities. The load characteristics are reasonably good and behave similarly to nickel-cadmium in terms of discharge. The high cell voltage of 3.6 volts allows battery pack designs with only one cell. Most of today's mobile phones run on a single cell. A nickel-based pack would require three 1.2-volt cells connected in series.



IX.PROGRAMMING

Code for Battery switching robot with BT control: -

```
#include <SoftwareSerial.h>

Software Serial my Serial (2, 3);

char data = 0;

in relay1 = 8;
in relay2 = 9;
in battvol1 = A0;
in battvol2 = A1;
in leftmotor1 = 4;
in leftmotor2 = 5;
in rightmotor1 = 6;
in rightmotor2 = 7;

void setup ()
{
  Serial. Begin(9600);
  mySerial.begin(9600);
  pin Mode(leftmotor1, OUTPUT);
  pin Mode(leftmotor2, OUTPUT);
  pin Mode(rightmotor1, OUTPUT);
```

```
 pin Mode(rightmotor2, OUTPUT);
 pin Mode(relay1, OUTPUT);
 pin Mode(relay2, OUTPUT);
 pin Mode(battvol1, INPUT);
 pin Mode(battvol2, INPUT);
 digital Write(relay1,LOW);
 digital Write(relay2,LOW);
 delay(1000);
 Stop();
}

void loop()
{
 if(mySerial.available()>0)
 {
  data = mySerial.read();
  if(data == 'F')
  {
   forward();
  }
   if(data == 'B')
  {
   backward();
  }
   if(data == 'L')
  {
   left();
  }
   if(data == 'R')
  {
   right();
  }
   if(data == 'S')
  {
   Stop();
  }
   if(data == 'W')
  {
   frontlighton();
  }
   if(data == 'w')
  {
   frontlightoff();
  }
   if(data == 'U')
  {
   backlighton();
  }
   if(data == 'u')
  {
   backlightoff();
  }
 }
}

void forward()
{
 digital Write(leftmotor1, LOW);
 digital Write(leftmotor2, HIGH);
 digital Write(rightmotor1, LOW);
 digital Write(rightmotor2, HIGH);
 Serial.println("Forward");
 backlightoff();
```

```
  frontlighton();
}

void backward()
{
  digital Write(leftmotor1, HIGH);
  digital Write(leftmotor2, LOW);
  digital Write(rightmotor1, HIGH);
  digital Write(rightmotor2, LOW);
  backlighton();
  frontlightoff();
}

void left()
{
  digital Write(leftmotor1, LOW);
  digital Write(leftmotor2, HIGH);
  digital Write(rightmotor1, LOW);
  digital Write(rightmotor2, LOW);
  backlightoff();
  frontlighton();
}

void right()
{
  digital Write(leftmotor1, LOW);
  digital Write(leftmotor2, LOW);
  digital Write(rightmotor1, LOW);
  digital Write(rightmotor2, HIGH);

  backlightoff();
  frontlighton();
}

void Stop()
{
  digital Write(leftmotor1, LOW);
  digital Write(leftmotor2, LOW);
  digital Write(rightmotor1, LOW);
  digital Write(rightmotor2, LOW);
  backlightoff();
  frontlightoff();
  in battval1 = analogRead(battvol1);
  in battval2 = analogRead(battvol2);
  Serial.print(battval1);
  Serial.print("    ");
  Serial.println(battval2);
  if(battval1 > battval2)
  {
    digital Write(relay1, HIGH);
    digital Write(relay2, LOW);
    delay(1000);
  }
  else if(battval2 > battval1)
  {
    digital Write(relay1, LOW);
    digital Write(relay2, HIGH);
    delay(1000);
  }
}

void frontlightoff()
{
```

```
  digital Write(A4, LOW);
}
void frontlighton()
{
  digital Write(A4, HIGH);
}
void backlightoff()
{
  digital Write(A5, LOW);
}
void backlighton()
{
  digital Write(A5, HIGH);
}
```

X. ADVANTAGES

Cleaner environment
No congestion charge
Lower running costs
Renewable electricity tariffs
Better driving experience
Free parking
Zero pollution if run from renewable power sources…including rooftop-solar.
About 25% of the pollution of a gas car if run from nasty coal-generated electricity.
12% of the pollution of a gas car if run from natural-gas-generated electricity.
Very little noise pollution.
Almost no maintenance/servicing required over the life of the car. Tires, wiper blades and cabin air filters are probably the only things that the car will ever require. With regenerative braking, brake pads and disks will probably outlast the car.

XI. Disadvantages

Weight and size of electrical car is more.
Due to more space, increases the tractive efforts.
Unwanted loading on wheels while dynamic condition.
Minor fluctuations voltage is formed during generation mode.
Maintains the battery condition periodically.
Installation cost is high.
Maintains is also more.
Wheel rolling resistance is more due to weight.
Due to heavy weight, when E-car travels against gravity consume more power.
It's required constant speed to get maximum efficiency.

XII. APPLICATIONS

Consumer Electronics.
Public Transportation.
Aviation.
Electricity Grid.
Renewable Energy Storage.
Military.
Spaceflight.
Wearable Technology.
Personal transportation: EVs are becoming increasingly popular as an alternative to gasoline-powered cars for personal transportation.
Fleet transportation: Many government agencies and companies are incorporating EVs into their fleets for more sustainable and cost-effective transportation.
Delivery and courier services: EVs are ideal for short-distance delivery services as they are quiet and emission-free.
Public transportation: Buses, trains, and trams powered by electricity are becoming increasingly common in cities for low-emission public transportation.
Industrial and commercial applications: EVs are used in a variety of industrial and commercial applications, such as material handling equipment, airport ground support vehicles, and maintenance vehicles.
Off-road vehicles: Electric ATVs, motorcycles, and dirt bikes are gaining popularity for off-road recreation and work applications.
Energy storage systems: EVs can be used as mobile energy storage systems to help stabilize the grid and provide backup power during outages.

XIII. CONCLUSION

When dual battery system is used with self-energized, at that condition battery power or power management is better than single battery system. Maximum power is delivered to electric driving motor so heating problems are generated so max power applications run only single battery system and another battery system is run for miscellaneous load like lighting load in electrical car, AC, sound system, and other required load. Then this system design is very efficient for electrical CAR, Electrical BUSES.

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