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Electric Motorbike

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Abstract - Electric automobiles (EVs) are a promising era for reaching a sustainable shipping region within the future, because of their very low to zero carbon emissions, low noise, high performance, and versatility in grid operation and integration. This bankruptcy includes a top level view of electric vehicle technology in addition to related strength garage systems and charging mechanisms. Different varieties of electric-drive automobiles are offered. These encompass battery electric cars, plug-in hybrid electric cars, hybrid electric powered motors and gasoline cellular electric powered motors. The topologies for each class and the enabling technology are mentioned. Various electricity train configurations, new battery technology, and different charger converter topologies are delivered. Electrifying transportation no longer only helps a smooth strength transition, however additionally allows the diversification of transportation's zone gas mix and addresses power safety issues. In addition, this will be also visible as a possible solution, with a view to alleviate troubles related to climate alternate. Furthermore, charging requirements and mechanisms and relative impacts to the grid from charging automobiles also are offered.

INTRODUCTION

The most essential part of motorcycle designing is figuring out the geometry of the chassis. It consequences in the ordinary conduct of the bike. The geometry determines the general stiffness, aerodynamics, rider position and luxury, and additionally influences managing, maneuverability and responsiveness.

Electric System

A model of the automobile became created in Matlab Simulink to analyse the diverse parameters required for the battery p.C.. The parameters that we calculated are battery percent capacity and SOC for a required variety. This is executed with the aid of the subsequent methodology:

Vehicle model

A physical model of the vehicle become created in Simulink. In order to calculate this multiple resistive forces like rolling force, aerodynamic pressure, gradient force and acceleration force is calculated using coefficient of rolling friction, gross car mass, inclination of road floor, drag coefficient, frontal location, density of air and wheel radius as input parameters.

Drive cycle data

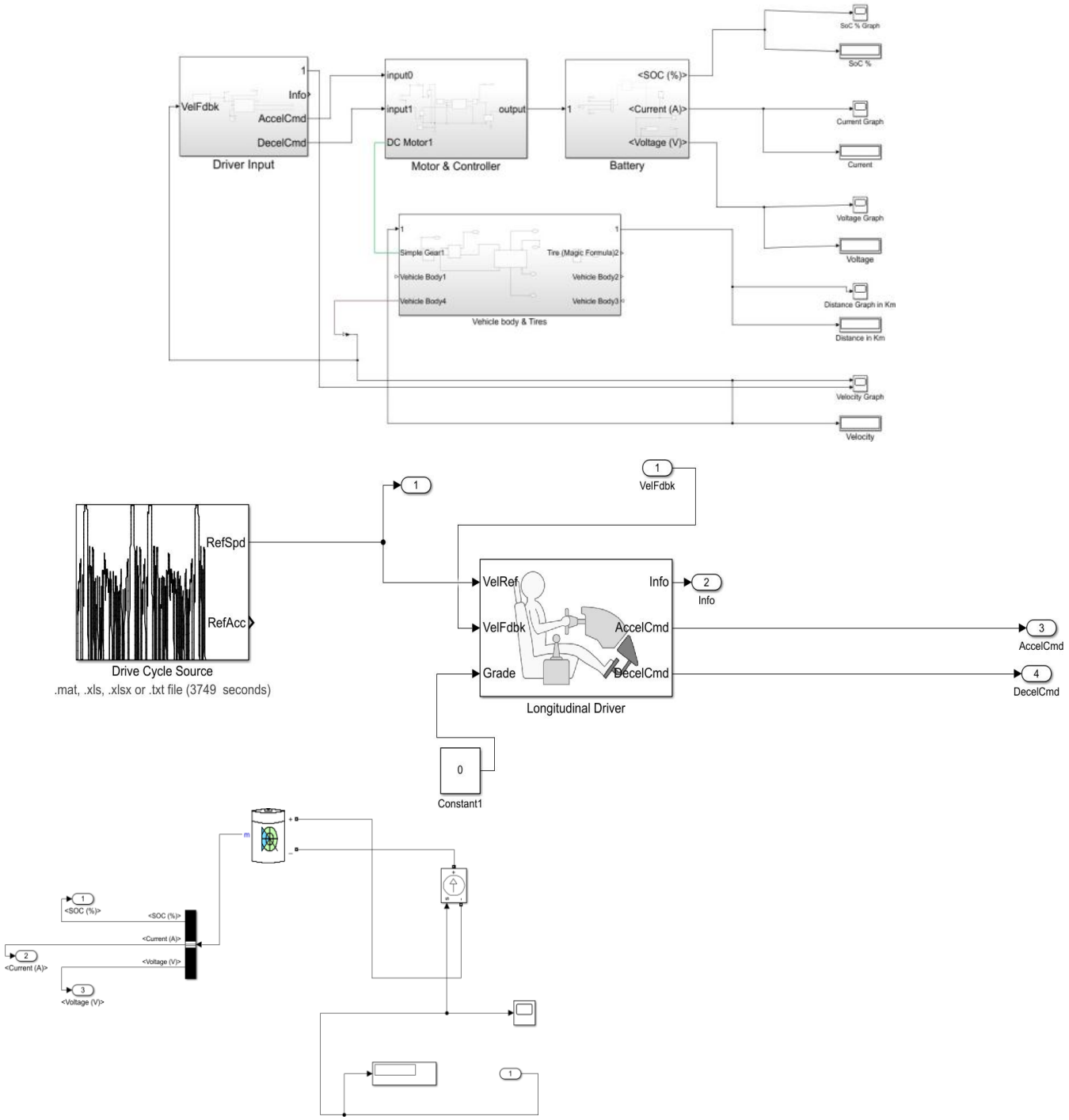
Drive cycle source is supplied to the car model to decide the internet energy required to satisfy the cycle. FTP-75 (Federal take a look at technique) drive cycle records was utilized for supplying pressure cycle enter to the automobile model. Drive cycle supply block includes speed-time records for the vehicle.

Motor

Motor efficiency and gear ratio information is input to calculate strength required to gain desired torque to the rear wheel to conquer the resistive force at the rear wheel that's calculated from the above sub-system.

Battery percent

After calculating the power requirement of the motor we calculate the battery ability. Total quantity of cells in battery percent, no. Of cells in collection and parallel may be calculated with mobile ability and battery back ability. SOC is calculated the usage of battery cutting-edge discharged with the aid of the motor and the potential of the battery p.C.



2. Cell : LG CHEM 18650 MJ1

Here we have chosen lithium ion cells over other cells due to following reasons:

1.High energy density

2.Low self-discharge

3.Low maintenance

4.Many options to choose in terms of capacity and geometry

5.Flexibility and high power to weight ratio

6.High life cycle

In cell selection we had many different types of cell chemistry and dimensions. So we did a thorough research on which chemistry to choose among Lithium-Ion cells. The below table gives the specification of the chosen cell.

Dimension

●Diameter: 18.4 +0.1 / -0.3 mm (Max. 18.5mm)

● Height: 65.0 ±0.2mm (Max. 65.2mm)

Performance Specification

1. Standard test circumstance

1.1. Standard Charge:

Unless in any other case unique, "Standard Charge" shall include charging at constant present day of 0.5C. The cell shall then be charged at constant voltage of four.20V at the equal time as tapering the charge present day-day. Charging shall be terminated whilst the charging present day has tapered to 50mA. For take a look at capabilities, charging will be completed at 23ºC ± 2ºC.

1.2. Standard Discharge:

"Standard Discharge" shall include discharging at a consistent present day of zero.2C to 2.50V. Discharging is to be executed at 23 ºC ± 2 ºC besides in any other case mentioned (at the side of capability as opposed to temperature).

1.3 High Drain fee Charge/discharge circumstance:

Cells will be charged at regular contemporary of 1,500mA to 4.20V with forestall cutting-edge of 100mA. Cells will be discharged at constant present day of four,000mA to 2.50V. Cells are to rest 10 mins after fee and 20 minutes after discharge.

3. Battery Accumulator

A battery is a tool consisting of one or extra electrochemical cells with external connections provided to power electric powered gadgets in conjunction with flashlights, smartphones, and electric vehicles. When a battery is presenting electric powered electricity, its high quality terminal is the cathode and its poor terminal is the anode.

Battery accumulators of electrical vehicles, additionally referred to as traction batteries, are the gasoline center of the vehicle. A battery % is the collection of cells arranged in collection-parallel combinations as an entire. Various varieties of strength storage gadgets are advanced like flywheel, gravity garage, lithium ion, nickel metal hydride cells, Lead acid battery and so forth. In our proposed prototype we're the use of lithium ion cells having cylindrical geometry.

4. Battery Management System: Orion Jr 2 BMS

The battery control gadget (BMS) for an electric powered vehicle can range immensely counting on which producer and model making a decision to format round. One of the most important elements that drove our selection became whether or now not the BMS had a centralized topology. A centralized topology way that every one of the voltage and thermistor tap statistics is processed within a unmarried BMS. This is useful because of the fact that you may only have two feasible points of connection failure and do no longer want to layout, manufacture person cell PCBs a great way to manner the statistics before sending it to the BMS. Many other factors had been considered, including whether or not or no longer it may speak over CAN, what number of cells it could screen both with voltage and temperature, and whether or not or now not it changed into isolated from its voltage taps.

A. Microcontroller

Arduino Uno is a microcontroller board based totally on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a sixteen MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It consists of the whole lot needed to help the microcontroller; definitely connect it to a laptop with a USB cable or electricity it with a AC-to-DC adapter or battery to get began.

B. Dashboard

Nextion is a continuing Human Machine Interface (HMI) answer that gives a control and visualization interface among a human and a method, device, Software or appliance. Nextion is mainly carried out to Internet of aspect (IoT) or customer electronics area. It is the satisfactory solution to update the conventional LCD and LED Nixie tube.

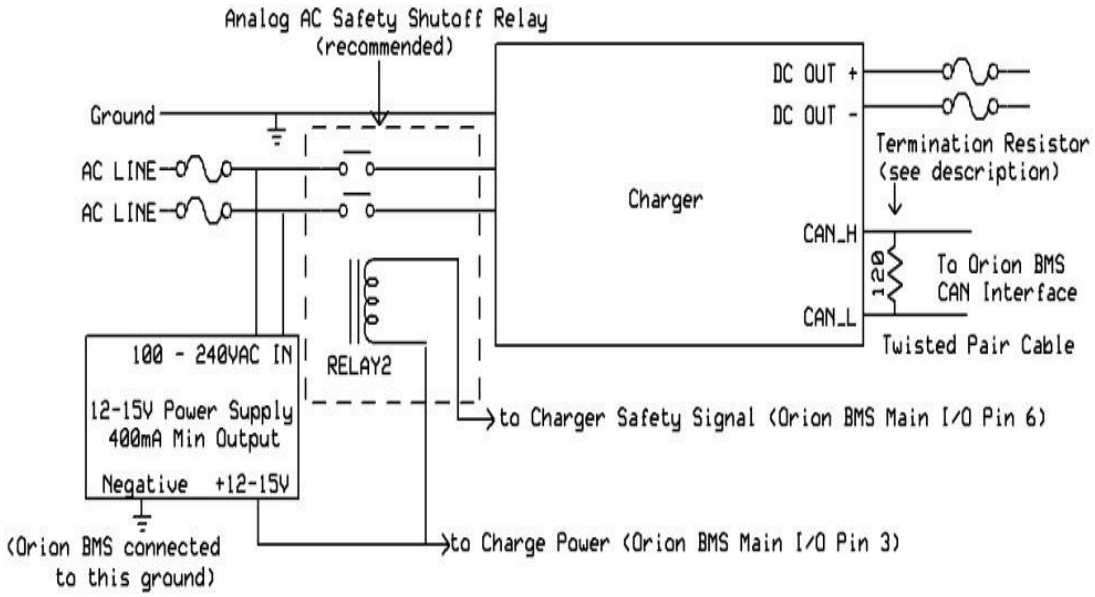
Nextion consists of a hardware element (a series of TFT forums) and a software part (the Nextion editor). The Nextion TFT board makes use of most effective one serial port to speak. It we could users avoid the problem of wiring.

Nextion editor has mass additives inclusive of button, textual content, progress bar, slider, tool panel and many others. To enhance the interface design. Furthermore, the drag-and-drop feature ensures that customers spend much less time in programming, as a way to reduce 99% of their development workloads. With the help of this WYSIWYG editor, designing a GUI is as easy as it gets.

1. Uploading the mission onto the Nextion Display Selecting Upload will launch an Open conversation to select a *.TFT file before the Upload to Nextion Device conversation. Ensure the Nextion is attached thru serial (typically through USB to TTL adapter) earlier than upload or the Port might not be to be had to choose. Auto seek characteristic will search for your Nextion's reply to the join instruction, however recognize that records is being dispatched on all serial ports which can be searched (and can intrude with the alternative connected serial devices). A better choice is to pick the proper Port and Baud Rate. Proper configuration of Serial adapters, Windows drivers, device conflicts, and so on is beyond the scope of Nextion aid and stays the domain of person duty to understand their used Operating System and devices.

Once Nextion has answered to the join practice, the upload system will begin. Do not interrupt this method until completed. If the process has been interrupted, resetting the serial port may be required. When a partial

*.TFT file has been uploaded and uploading over serial is no longer an option, then the user will need to upload via the microSD method.



2. Code:

```
// digital pin 2 is the hall pin int hall_pin = 2;
// set number of hall trips for RPM reading (higher improves accuracy) float hall_thresh = 100.0;
//bms analog pin is connected to pin 13 int soc = 13
//lean sensor for crash safety const int MPU_addr=0x68; int16_t AcX,Tmp,GyX;
int minVal=265; int maxVal=402; double x;
int headlamp = 1; int taillamp = 2; int br=3;
```

```
int bl=4; int fr=5; int fl=6;
int head =8;
int tail =9; int left=10; int right=11;

void setup()
{
// initialize serial communication at 9600 bits per second: Serial.begin(115200);
// make the hall pin an input: pinMode(hall_pin, INPUT); pinMode(soc, INPUT); Wire.begin();
Wire.beginTransmission(MPU_addr); Wire.write(0x6B);
Wire.write(0); Wire.endTransmission(true); pinMode(head, INPUT); pinMode(tail, INPUT); pinMode(left, INPUT); pinMode(right, INPUT); pinMode(headlamp, OUTPUT); pinMode(tail, OUTPUT); pinMode(br, OUTPUT);

pinMode(bl, OUTPUT); pinMode(fr, OUTPUT); pinMode(fl, OUTPUT);
}

// the loop routine runs over and over again forever: void loop()
{
// preallocate values for tach
a= analogRead(soc); // reading from the bms as a analog output. float hall_count = 1.0;
float start = micros(); bool on_state = false;
// counting number of times the hall sensor is tripped
// but without double counting during the same trip while(true)
{
if (digitalRead(hall_pin)==0)
{
if (on_state==false)
{
}
}
else
{
on_state = true; hall_count+=1.0;
on_state = false;
}if (hall_count>=hall_thresh)
{
Break;
}
}
// print information about Time and RPM float end_time = micros();

float time_passed = ((end_time-start)/1000000.0); float rpm_val = (hall_count/time_passed)*60.0; float speed_1= 602*rpm_va;*0.001885

// Send tachometer value: Serial.print("RPM.val="); Serial.print(rpm_val); Serial.print("SoC.val="); Serial.print(a); Serial.print("Speed.val="); Serial.print(speed_1);

Serial.write(0xff); // We always have to send this three lines after each command sent to the nextion display.

Serial.write(0xff);
```

```
Serial.write(0xff);
delay(1); // delay in between reads for stability */ Wire.beginTransmission(MPU_addr); Wire.write(0x3B);
Wire.endTransmission(false); Wire.requestFrom(MPU_addr,14,true); AcX=Wire.read()&lt;&lt;8|Wire.read();
int xAng = map(AcX,minVal,maxVal,-90,90); x= RAD_TO_DEG * (atan2(-yAng, -zAng)+PI); Serial.print("AngleX= ");
Serial.println(x); if(x>60)
{
}
else
{
}
digitalWrite(12,LOW);
digitalWrite(12,HIGH);
 Serial.println("   ");
delay(400);
int b1 = digitalRead(head); Serial.println(b1);
if (b1 == 1)
{
}
Else
{
}
 digitalWrite(headlamp, HIGH);
digitalWrite(headlamp, LOW);
 int b2 = digitalRead(tail); Serial.println(b2);
if (b2 == 1)
{
}
else
{
}
 digitalWrite(taillamp, HIGH);
digitalWrite(taillamp, LOW); delay(1);
int b3 = digitalRead(left);
 Serial.println(b3); if (b3 == 1)
{
}
else
{
}
 digitalWrite(bl, HIGH); digitalWrite(fl, HIGH);
```

```
digitalWrite(bl, LOW); digitalWrite(fl, LOW);
 int b4 = digitalRead(right); Serial.println(b4);
if (b4 == 1)
{
 }else
{
}
}
```

Safety System

The strength from the battery flows to the motor controller via a contractor, which in flip is latched ON/OFF by using a sequence of switches, relays and safety tracking gadgets. Should a fault be detected by using both the IMD and the BMS, or ought to the emergency transfer be pressed, the magnetic coil within the contactor could be powered down and the contactor will reduce the deliver to the motor controller.

1. Insulation monitoring device (IMD):

An insulation monitoring tool monitors the ungrounded machine among an active section conductor and earth. It is intended to offer an alert (mild and sound) or disconnect the strength deliver whilst the resistance between the 2 conductors drops under a hard and fast fee. We have selected IMD from Bender to continuously display the insulation of the High Voltage cables.

The IMD 'Status output' signal drops too low in case of any abnormality detected, thereby powering off the contactor.

BMS controlled Shutdown

The discharge permit pin(pin no.Three) of the Orion jr. BMS is accountable to output a zero voltage in the occasion of any fault sensed via the BMS, which in flip powers down the relay and powers the contactor off.

Conclusion – This paper is all about the EV battery setup, Voltage and design of the vehicle. We have created the stimulation model as well and used certain tools mentioned in the paper, for instance microcontroller. Charging requirements and mechanisms and relative impacts to the grid from charging automobiles also are offered.

REFERENCES

[1] Jones, W.D., "Hybrids to the rescue [hybrid electric vehicles]", IEEE Spectrum, Vol. 40(1), 2003, pp. 70 – 71.

[2] Jones, W.D., "Take this car and plug it [plug-in hybrid vehicles]", Spectrum, IEEE, Vol. 42, Issue 7, July 2005, pp. 10 – 13.

[3] Hyunjae Yoo; Seung-Ki Sul; Yongho Park; Jongchan Jeong, "System Integration and Power-Flow Management for a Series Hybrid Electric Vehicle Using Supercapacitors and Batteries", IEEE Trans. on Industry Applications, Vol. 44, Issue 1, Jan.-Feb. 2008, pp. 108 – 114.

[4] Haddoun, A.; Benbouzid, M. E. H.; Diallo, D.; Abdessemed, R.; Ghouili, J.; Srairi, K., "A Loss-Minimization DTC Scheme for EV Induction Motors", IEEE Trans on Vehicular Technology, Vol. 56(1), Jan. 2007, pp. 81 – 88.

[5] Jinyun Gan; Chau, K.T.; Chan, C.C.; Jiang, J.Z., "A new surface-inset, permanent-magnet, brushless DC motor drive for electric vehicles", IEEE Transactions on Magnetics, Vol. 36, Issue 5, Part 2, Sept 2000, pp. 3810 – 3818.

[6] Chau, K.T.; Chan, C.C.; Chunhua Liu, "Overview of Permanent-Magnet Brushless Drives for Electric and Hybrid Electric Vehicles", IEEE Trans. on Industrial Electronics, Vol. 55, Issue 6, June 2008, pp. 2246 – 2257.

[7] Rahman, K.M.; Fahimi, B.; Suresh, G.; Rajarathnam, A.V.;Ehsani, M., "Advantages of switched reluctance motorapplications to EV and HEV: design and control issues",IEEE Transactions on Industry Applications, Vol. 36,Issue 1, Jan.-Feb. 2000, pp. 111 – 121.

[8] Jones, W.D., "Putting Electricity Where The Rubber Meetsthe Road [NEWS]", IEEE Spectrum, Vol. 44, Issue 7,July 2007, pp. 18 – 20.

[9] Affanni, A.; Bellini, A.; Franceschini, G.; Guglielmi, P.;Tassoni, C., "Battery choice and management fornew-generation electric vehicles", IEEE Trans. on IndustrialElectronics, Vol. 52(5), Oct. 2005, pp. 1343 – 1349.

[10] Chan, C.C. The Present Status and Future Trends of Electricvehicles, Science and Technology Review, Vol. 23, No. 4,Feb 2005

[11] Andrew Williams, "MIT Battery Breakthrough Could Revolutionize Electric Cars", March 12th, 2009 inBatteries, Electric Cars (EVs), http://gas2.org/2009/03/12/mit-battery-breakthrough-could-r evolutionize-electric-cars/

[12] Y.Lu, Cheng K.W.E., S.L.Ho, J F Pan, "Passivity-Based Control of Phase Shifted Resonant Converter", IEEE Proc.Elect. Power Appl., Vol. 152(6), Nov. 2005, pp.1509 –1515