

Super-Capacitor Based Metro Train

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Abstract:- Energy can generate from sources like wind, hydro, solar, coal as fuel in generating plant, but there is cost problem for establishing, running, and maintenance or availability of fuel which are going exhausted one day. New generation of rapid transit train requires more effective energy management for reduction energy consumption during the journey. In India where population is growing up extremely. So it is essential to control the traffic in big cities of India and also necessary to control the pollution of environment. So metro is best way to control the traffic also these mass transit vehicle reduce the emissions. Here metro is not completely depended on electricity means to say that here continuous supply will be eliminated. Overhead line and other electrical equipment require in metro train system will also reduce. Here we are going to drive the metro train on Super-capacitor unit, it act like battery. This Supercapacitor gives the continuous supply to the motor of the metro train. This system having one time installation cost. The super-capacitor based metro train is one of the best achievement in future.

I. INTRODUCTION

Metro train gives safe and easy transit and is therefore regarded as green transportation mode as compared to buses and private car services. Metro train are commonly use in big cities for fast transit as distance between two station is less. Due to large scale operation of metro trains specially in big cities and High frequency services, great amount of energy consume for the daily operations. In present scenario railway traction drive use of overhead lines for supplying Electrical energy from the feeding substation to running rail vehicles through pantograph. Due to overhead line huge amount losses is there which reduces the overall efficiency of the system. By reducing the overhead line we can reduce the losses in traction system. We are drive the metro train with the help of Supercapacitor it act like battery, which is very bulky and huge, as capacitor bank is require some place to install it on train so so it will give power supply to motor. The charging of Supercapacitor will be done by renewable and non-Renewable energy sources at every station. Solar panel use as renewable energy source which is mounted on station roofs. On the basis of working of metro train, the supercapacitor system has been used for energy that tries to limit overhead current and, consequently drop of voltage at the train pantograph. This will eliminate the use of overhead line, construction of single pole, electric wires and will also reduce the running and maintenance cost. The supercapacitor based metro train will be great achievement in future by looking for rapid consumption of fuel in present situation.

II. OBJECTIVE

Now a days the metro faces the problem regarding the excessive use of electricity and the maintenance require for overhead line. And due to continuous use of overhead line there is chances of line failure. So in this project we use Supercapacitor and Supercapacitor has ability to minimise the use of electricity and eliminate the continuous use of overhead line and also reduce risk or line failure. This system is fully based on electronics(using microcontroller and sensors) and highly reliable and less expensive to implement and can be implemented. Charging of Supercapacitor will done by conventional and non-conventional sources so overall this system is solar based metro train. This system will help to save fossil fuels and provide an efficient way of operating the metro.

III. PROJECT METHODOLOGY

As the aim of our project is to drive a metro train with the help of Supercapacitor, the supercapacitor are connected in series and parallel combination according to voltage and current requirement. This Supercapacitor act like battery and placed in train so that it directly transmit its power to the motor of the metro train. Hence battery also get discharge by giving its power for full filling the need of some system operation. When supercapacitor supplying continuous power to the motor then it also get discharge after

some period of time, so it is essential to charge this capacitor unit. Supercapacitor is charged at every metro station through pantograph which is mounted at roof of metro train. And overhead catenary is installed at every station to provide charging to super-capacitor through pantograph. When the train reaches at any station the pantograph directly to connect to overhead catenary as charging process is take place. We are using two sources as power supply to the overhead catenary i.e. solar pane as non-conventional source and SMPS (switch mode power supply) as conversational source to perform the metro operation more efficiently. The power comes from both the sources is stored in battery which is also placed at metro station, this battery supplies power to the overhead catenary installed at that particular station for charging of Supercapacitor bank. This same installation is done at every station for charging of Supercapacitor. The forward and reverse Operation of motor is controlled by the microcontroller through the realys . There two realys provided in metro circuit which perform forward and reverse Operation by switching one relay at time. The microcontroller sends the signal to relay and according to singal receive by the relay, and switching is take place and motor will be operated.

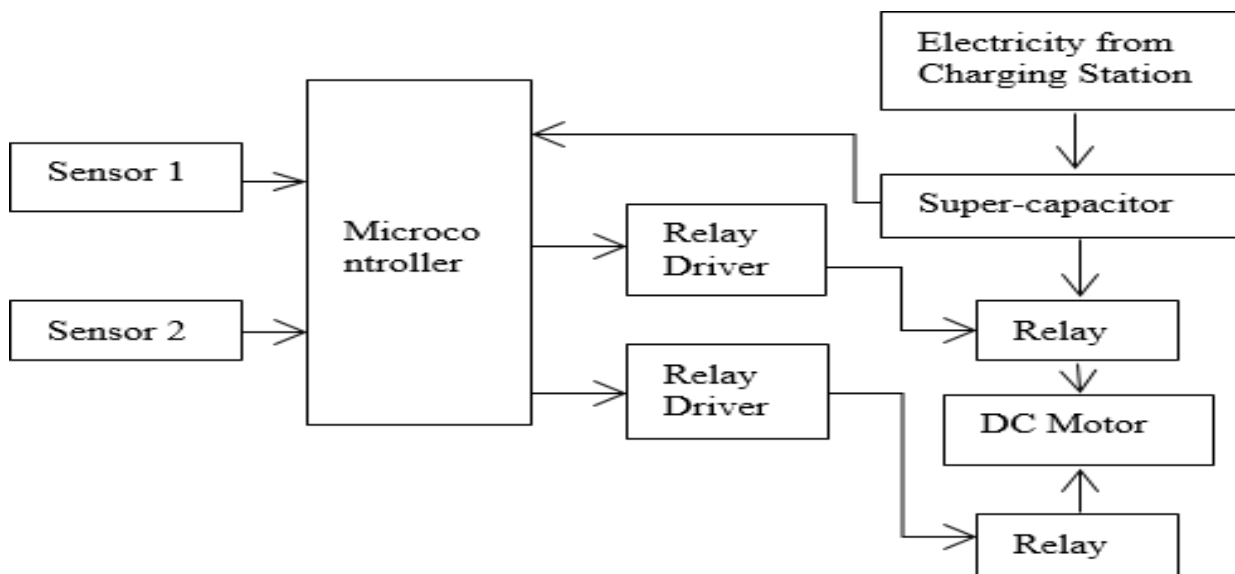


Fig.1 Block diagram of super-capacitor based metro train.

IV. ADVANTAGES

- Maintenance is low.
- Eliminate electrical components.
- Elimination of transmission losses
- Reduce the risk of line failure.
- Eliminate continuous use of overhead lines

V. CONCLUSION

Our aims to design a reliable system which having greater efficiency. Super-capacitor have many advantages and prevent from technical snags related with overhead catenary. Super-capacitor also reduce risk of line failure as we reduced overhead catenary. Use of solar energy to drive metro train also reduce the consumption of non-renewable fuels required for generation of electrical energy.

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