IJIREEICE

ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

ISO 3297:2007 Certified

Vol. 5, Issue 4, April 2017

A Magnetic Resonance Based Wireless Power Transfer System for Electric Vehicle using PWM

G. Vinitha Sanchez[1], T.S. Vishnu Priya[2]

Department of ECE, Sastra University[1,2]

Abstract: The serious environmental pollution caused by internal combustion engines, together with the depletion of fossil fuels, has motivated global interest in eco-friendly energy. Notably, electric vehicle technology has been developed to reduce the use of fossil fuels in vehicles, which are the main fossil fuel consumers. As a result, hybrid electric vehicles that use both a combustion engine and an electric engine have already been widely commercialized. However, all-electric vehicles, such as plug-in electric vehicles and battery electric vehicles, are distributed narrowly at present owing to some battery-related drawbacks such as large size, heavy weight, high price, long charging time, and short driving range. These problems are not easily solved by current battery technology. In an effort to address battery problems, the concept of roadway-powered electric vehicles has been proposed. With this system, the electric vehicle is charged on the road by wireless power charging, and the battery can hence be downsized and no waiting time for charging is needed.

Keywords: Wireless Power Transfer System, Electric Vehicle, PWM, Magnetic Resonance.

I. INTRODUCTION

A main objective of our project is to design and implement a wireless power transfer system for electric vehicle through magnetic resonant coupling. To recover the disadvantages of long charging time and short driving range, wireless charging concept helps to charge the electric vehicle while moving on the roadway. Much research on wireless power transfer for electric vehicles has been performed over the past few decades. The Partner for Advanced Transit and Highways project of the University of California, Berkeley, developed a roadway-powered electric vehicle system with 60% power efficiency at an 8-cm air gap. When a magnetic coil placed in the vehicle meets the coil placed in the roadway, then the coupling takes place and the power is generated.

The online electric vehicle (OLEV) center of the Korea Advanced Institute of Science and Technology has developed a high-efficiency roadway-powered electric vehicle system.

To achieve high efficiency of power transfer, many techniques, including resonant inverters for wireless power transfer, efficient pickup modules effective pickup tuning methods, and pickup voltage control methods, have been proposed. We have used RFID technology for generating power only for registered users which improves the security. Electrical and practical designs of the inverter, power lines, pickup, rectifier, and regulator as well as an optimized core structure design for a large air gap are described. Air gap between the two coils is increased from 8cm to 20cm with the help of Pulse Width Modulation which increases gain. Finally 6.6kW power with 80% power transfer efficiency is obtained.

II. EXISTING SYSTEM

In the existing system, Environmental pollution caused by internal combustion engines, together with the depletion of fossil fuels, has motivated global interest in eco-friendly energy. Notably, electric vehicle technology has been developed to reduce the use of fossil fuels in vehicles, which are the main fossil fuel consumers. All-electric vehicles, such as plug-in electric vehicles and battery electric vehicles, are distributed narrowly at present owing to some battery-related.

Drawbacks:

- Large Size
- Heavy Weight
- High Price
- Long Charging Time
- And Short Driving Range

These Problems Are Not Easily Solved By Current Battery Technology.

IJIREEICE

ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

ISO 3297:2007 Certified

Vol. 5, Issue 4, April 2017

III. PROPOSED SYSTEM

In this system, the electric vehicle is charged on the road by wireless power charging, and the battery can hence be downsized and no waiting time for charging is needed. To achieve high output power and power transfer efficiency, an inverter, power line modules, pickup modules, rectifiers, and regulators were optimally designed. The OLEV system achieved 100-kW output power with 80% power efficiency at a 26-cm air gap.

Programming Algorithm

To program the AT89C51, take the following steps.

- Input the desired memory location on the address lines.
- Input the appropriate data byte on the data lines.
- Activate the correct combination of control signals.
- Raise EA/VPP to 12V for the high-voltage programming mode.
- Pulse ALE/PROG once to program a byte in the Flash array or the lock bits. The byte-write cycle is self-timed and typically takes no more than 1.5ms. Repeat steps 1 through 5, changing the address and data for the entire array or until the end of the object file is reached.

Block diagram

Transmitter section:

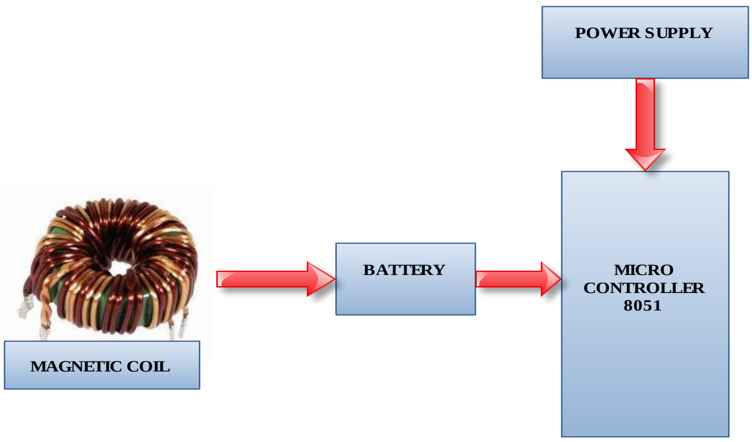


Figure 3.1 Block diagram of transmitter section

Receiver section:

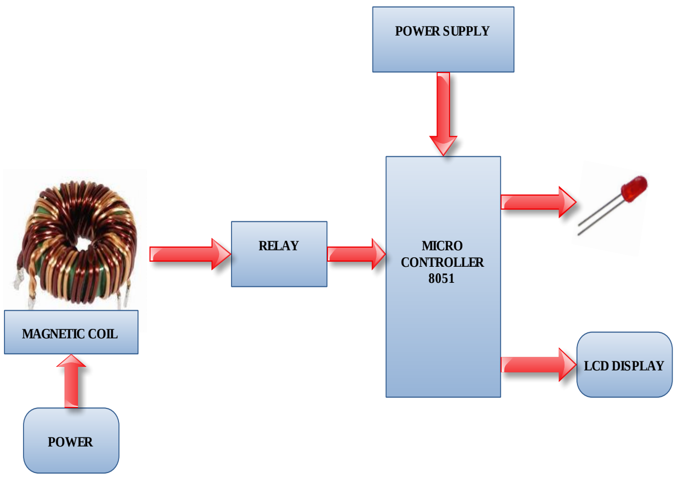
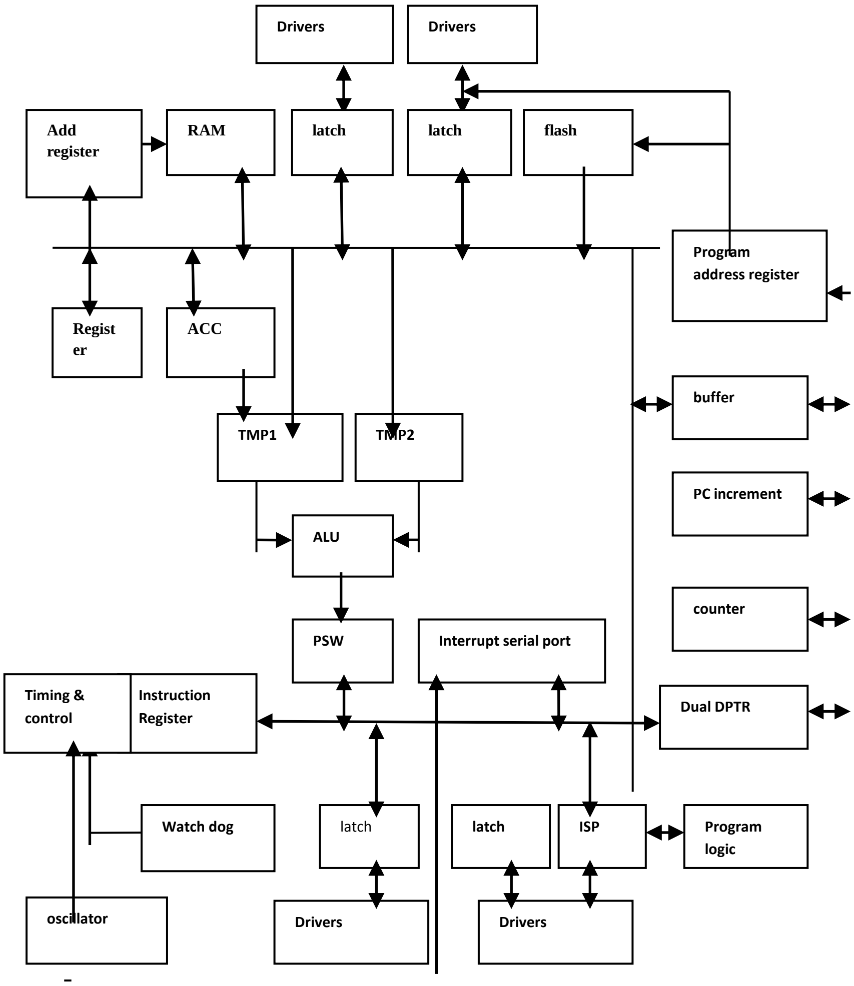


Figure 3.2 Block diagram of receiver section

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 4, April 2017

BLOCK DIAGRAM



IV. CONCLUSION

It has presented the design and implementation of a wireless power transfer system for moving electric vehicles. To achieve high output power and power transfer efficiency, an inverter, power line modules, pickup modules, rectifiers, and regulators were optimally designed. A power line segmentation method was also proposed. Considering EMF exposure to people, EMF shielding was designed to satisfy EMF level regulations. The entire system was implemented and tested. The system provided 100-kW power with over 80% power transfer efficiency at 26-cm air gap. The performance and actual operation were verified through simulations, experiments, and field tests.

REFERENCES

[1] O. H. Stielau and G. A. Covic, "Design of loosely coupled inductive power transfer systems," in Proc. Int. Conf. Power Syst. Technol., Dec. 2000, vol. 1, pp. 85–90.
[2] C. Wang, O. H. Stielau, and G. A. Covic, "Design considerations for a contactless electric vehicle battery charger," IEEE Trans. Ind. Electron., vol. 52, no. 5, pp. 1308–1314, Oct. 2005.
[3] J. Sallan, J. L. Villa, A. Llombart, and J. F. Sanz, "Optimal design of ICPT systems applied to electric vehicle battery charge," IEEE Trans. Ind. Electron., vol. 56, no. 6, pp. 2140–2149, Jun. 2009.
[4] C. J. Chen, T. H. Chu, C. L. Lin, and Z. C. Jou, "A study of loosely coupled coils for wireless power transfer," IEEE Trans. Circuits Syst., vol. 57, no. 71, pp. 536–540, Jul. 2010.
[5] M. Budhia, G. A. Covic, and J. T. Boys, "Design and optimization of circular magnetic structures for lumped inductive power transfer systems," IEEE Trans. Power Electron., vol. 26, no. 11, pp. 3096–3108, Nov. 2011.
[7] T. Imura and Y. Hory, "Maximizing air gap and efficiency of magnetic resonant coupling for wireless power transfer using equivalent circuit and Neumann formula," IEEE Trans. Ind. Electron., vol. 58, no. 10, pp. 4746–4752, Oct. 2011.
[8] Jaegue Shin, Seungyong Shin, Yangsu Kim, Seungyoung Ahn, Seokhwan Lee, Guho Jung, Seong-Jeub Jeon, " Design and implementation of shaped Magnetic-Resonance-Based Wireless power transfer system for Roadway-Powered Moving electric vehicles", IEEE transaction on industrial electronics, vol61, no 3,pp.1179-1192,ISSN:0278-0046,2013.