JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

WIRELESS POWER TRANSFER FOR ELECTRIC VEHICLE CHARGING WITH CRUISE CONTROL

Bharathi M[1], Mathumitha S[2], Magadhi T[3]

Professor [1], UG Scholar[2,3], Department of Electronics and Communication

Engineering, Kumaraguru College of Technology, Coimbatore-49

***Abstract*—In future, the E-Vehicle will be the upcoming trend of the world, but when it comes to charging time, it would take at least 3 to 8 hours of charging. In this proposed work the main motivation is to achieve the wireless power transmission for Evehicles on hybrid mode. To avoid collision, a system named "Adaptive cruise control" is developed. Adaptive cruise control (ACC) is a system designed to help vehicles maintain a safe distance and stay within the speed limit. This system adjusts a car's speed automatically. To automatically control the acceleration and braking of a vehicle by monitoring other vehicles and objects on the road, adaptive cruise control enables a safe driving.**

***Index Terms*—Electric vehicle, Wireless power transfer, Static charging, Cruise control.**

I. INTRODUCTION:

The embedded technology is now in its prime and the wealth of knowledge available is mind- blowing. Embedded system is a combination of hardware and software. This embedded tech- nology plays a major role in integrating the various functions associated with it. This needs to tie up the various sources of the department in a closed loop system. This proposal greatly reduces the manpower, time and it operates efficiently without human interference. This project puts forth the first step in achieving the desired target and with the advent in technology, the existing systems are developed to have in built intelligence. The external fields in the proximity of electric vehicle (EV) wireless power transfer (WPT) systems requiring high power may exceed the limits of international safety guidelines. Wire- less power transfer using magnetic resonance is the technology which could set human free from the annoying wires. The advancement makes the WPT very attractive to the electric vehicle charging applications in both stationary and dynamic charging scenarios. For energy, environment and many other reasons, the electrification for transportation has been carrying out for many years. In an electric vehicle, the battery is not so easy to design because of the following requirements: high energy density, high power density, affordable cost and reliability should be met simultaneously.

II. LITERATURE SURVEY:

A. *Wireless Power Transfer – An Overview*

Focusing on WPT systems, this paper [1] elaborates on current major research topics and discusses about future de- velopment trends. This novel energy transmission mechanism shows significant meanings on the pervasive application of renewable energies in our daily life which includes Contactless charging, capacitive coupled power transfer (CCPT), dynamic
charging, inductive power transfer (IPT), overview, WPT.

B. Adaptive cruise control for an intelligent vehicle

In this [2] research, an adaptive cruise control system is developed and implemented on an AIT intelligent vehicle. To develop the adaptive cruise control system, the original throttle system and braking system of the vehicle have to be modified. The original throttle valve which is controlled by a cable from the accelerator pedal is modified to the drive-by-wire system by using a dc motor with a position control algorithm.

C. Wireless Power Transfer by Electric Field Resonance and its Application in Dynamic Charging

In this [3] paper, the electric field resonance (EFR) method in railway vehicles, similar to the four-coil configuration of the magnetic field resonance wireless power transfer, is proposed for the capacitive coupling power transfer. The characteristics of the proposed method are derived and analyzed.

D. Personalized Adaptive Cruise Control Based on Online Driving Style Recognition Technology and Model Predictive Control

This paper proposes a personalized adaptive cruise control (ACC) system based on driving style recognition and model predictive control (MPC) to meet different driving styles while ensuring car-following, comfort and fueleconomy performances.

E. Potential of wireless power transfer for dynamic charging of electric vehicles

This paper [5] describes current traction battery technologies, conductive and inductive charging processes, DWPT system requirements, and the international standards and codes associated to EVs. Conducts a detailed survey on dynamic wireless charging infrastructure fundamentals and their implementation issues. Highlights the current barriers and potential issues for supporting and accelerating EVs' growth, with emphasis on the need for standardization.

III. PROPOSED SYSTEM:

In this proposed system, PIC-16F887A Micro Controller which is interfaced with Car Robot model & 16x2 LCD are used. Wireless Transmitter consists of odd winding copper coil, which is for the transfer of the power supply from primary coil to secondary coil by using the principle of mutual induction. In vehicle section the receiver module will be present, whenever the communication should happen between transmitter & receiver, the 16x2 LCD will be indicating the battery charging. The status will be monitored through 16x2 LCD. The engine control module regulates the engine throttle and changes the direction of the vehicle according to data from the Ultrasonic sensors (HC SR04) which are placed in Front, Left and Right side of the E- Vehicle robot model.

IV. METHODOLOGY:

A. Wireless power transfer for E-vehicle charging

This proposed work has mainly two sections, wireless power transmitter & a wireless power receiver sections. The Transmitter section of wireless charger circuit consists of a DC power source, oscillator and a transmitter coil. A constant DC voltage is provided by a DC power source, and this DC signal is the input to the oscillator circuit. This oscillator converts this DC voltage to a high frequency AC power and is supplied to the transmitting coil. Due to this high frequency AC current, the transmitter coil energizes, and generates an alternating magnetic field in the coil.

DC power Source: It consists of a step down transformer that step downs the supply voltage to a desired level, and a rectifier circuit to convert that AC voltage to DC signal.

Oscillator Circuit: A modified Royer Oscillator circuit is used in our project. With this circuit we can easily achieve a high oscillating current for the transmitter coil.

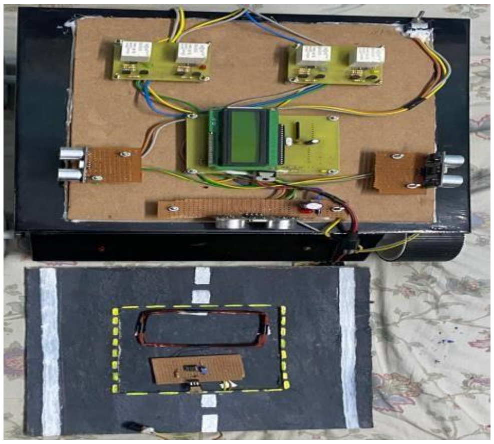

Fig 1

A. Adaptive cruise control:

To develop the adaptive cruise control system, the original throttle system and braking system of the vehicle is modified. The original throttle valve which is controlled by a cable from the accelerator pedal is modified to the driveby-wire system by using a dc motor with a position control algorithm. The braking system is modified by using a dc servo motor to directly control the brake pedal.

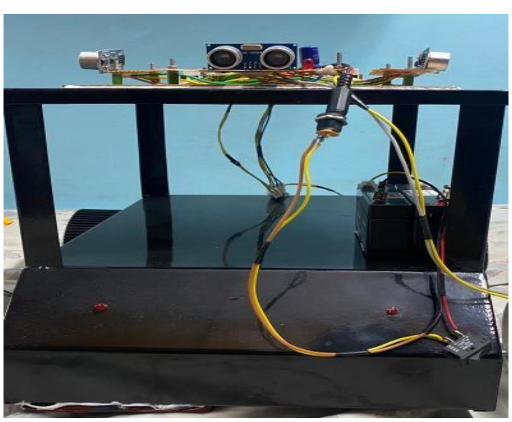

Fig 2

B. Software design using Proteus: The microcontroller simulation in Proteus works through making use of both a hex report or a debug report to the microcontroller element at the schematic. It is then co-simulated in conjunction with any analog and digital electronics related to it. This permits its use in a wide spectrum of project prototyping in regions along with motor manipulate, temperature manipulate and person interface design. It additionally unearths use withinside the standard network and, considering that no hardware is required, is handy to apply as a education or coaching

Support is to be had for co-simulation of Microchip Technologies like PIC10, PIC12, PIC16 and lots of different microcontrollers and different contraptions also can be summed up. For a full proper design (as prepared to a coded/synthesized design using, e.g., MPLAB IDE), the designing method begins by creating a coding. The coding is then compiled to verify operation. Finally, the extracted coding from MPLAB IDE is converted into a hex file and

tool. then fused to the microcontroller (in PROTEUS) to observe the speed of the car or check the battery charging level when the speed is increased or reduced.

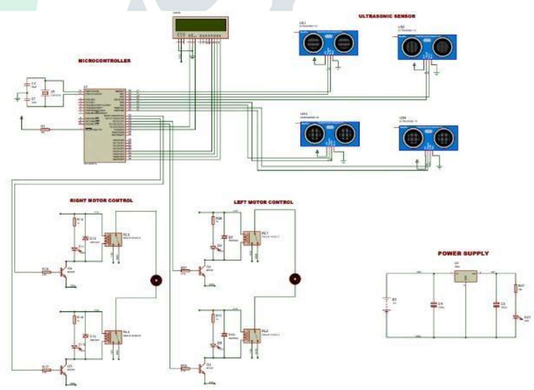

Fig 3

V. RESULTS AND DISCUSSION:

This paper summarizes a new analysis process for the computation of wireless charging technology on dynamic mode. Adaptive cruise control is also constructed on the Evehicle. The approach taken is novel in that primary-side power regulation is selected and developed with the aim to minimize vehicle on board complexity, size, and cost while retaining key scalability features considered necessary to meet future higher power WPT applications.

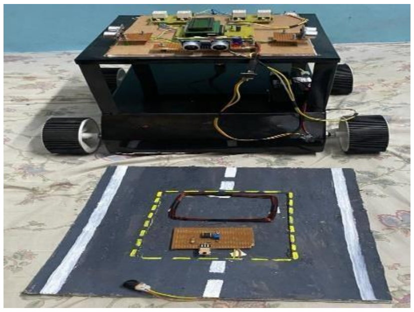

Fig 4

VI. FUTURE WORKS AND CONCLUSION:

The electrification of transportation is underway and wireless charging is poised to play a significant role. Wireless charging systems provide a convenient hands-off method to charge electric vehicles as standard conductive AC chargers. A broad view of Wireless power transfer for static E-vehicle has been seen and wireless charging of Electric vehicles using WPTs technology has been studied. Wireless power transfer for electric vehicle charging is done using the RF modules which are the transmitter and the receiver modes using PIC microcontroller as the major component now. In the future the wireless power transfer system can be done using the transmitter and the receiver coils. By using the ultrasonic sensor in cruise control, the distance can be notified and maintained to avoid collisions by controlling the speed of the vehicle to prevent accidents.

VII. REFERENCES:

- CHEN L, ZENG R 2017 Study of Wireless Power Transmission System Based on Magnetic Resonance Communications Power Supply Technology 34(04):10-12
- Huang X, Tan L, Chen Z, et al 2013 Review and research progress on wireless power transfer technology Transactions of China Electrotechnical Society 28(10):1-11.
- Yang H 2016 Principle and application of wireless power transmission Wireless Internet Technology (16):16-18
- Fan X, Mo X, Zhang X 2015 Research status and application of wireless power transmission technology Zhongguo Dianji Gongcheng Xuebao/proceedings of the Chinese Society of Electrical Engineering 35(10):2584-2600.
- Chen P, Liu X, Liu Z, Liu Z and Yang J 2017 Research on resonant coupled wireless power transmission technology Information Recording Materials 18(03):55-56
- Daniel, C & Johan, S. ”Adaptive Cruise Control for Heavy VehiclesHybrid Control and MPC”, (Master research Linkping University, Department of Electrical Engineering, 2003) Sweden Linkping University.
- Yu C 2012 Research on magnetic resonant wireless power transfer system Harbin Institute ofTechnology
- Liu N 2014 Research on the Characteristics of Wireless Power Transfer System via Magnetically Coupled Resonance Shandong University
- Li L,Yan Q 2017 Research on current development of Wireless Power Transfer System via Magnetically Coupled Resonance Information Recording Materials 18(4):4-6
- Liu Z, Chen Z, Lin X, Zhao H and Li J 2017 A review of progress in magnetically-coupled resonant wireless power transfer technology Journal of Nanjing University of Information Science & Technology(Natural Science Edition) 9(01):1-7
- Chen W, Chen Q 2016 Review and research progress of magnetic resonance wireless power transmission technology Advanced Technology of Electrical Engineering & Energy
- Chen C, Huang X, Sun W, et al 2014 Impact of metal obstacles on wireless power transmission system based coupled resonance Transactions of China Electrotechnical Society 29(9):22-26
- Zhang B, Huang R and Qiu D 2015 Key Problems of Midrange Wireless Power Transfer via Magnetic Resonances Journal of Power Supply 13(04):1-7
- Kim D W, Chung Y D, Kang H K, et al 2012 Characteristics of Contactless Power Transfer for HTS Coil Based on Electromagnetic Resonance Coupling IEEE Transactions on Applied Superconductivity 22(3):5400604-5400604

- Hong Z, Yan J, Hu W, et al 2016 Review and Research on Health and Safety Issues for Magnetically-Coupled Resonant Wireless Power Transfer Systems Transactions of China Electrotechnical Society
- Zhang Y 2013 The Development and Application of Wireless Power Transmission Technology Jiangsu Electrical Engineering 32(2):82-84
- Li Z 2016 Transfer efficiency analysis and optimization for wireless power transfer via magnetic resonance Hunan University.
- Bishop, R.H. ”Intelligent Vehicle Technology and Trends” ArtechHouse Publishers 2005.
- Xiong W, Li A, Ren Q, Zhou Y and Zhang B 2016 Review on Application of Wireless Charging Device on Electric Vehicles Telecom Power Technology 33(03):26-28+32.