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A NEW INTEGRATION METHOD FOR AN ELECTRIC VEHICLE WIRELESS CHARGING SYSTEM USING LCC COMPENSATION

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Abstract - *In this project LCC compensation is used. Wireless charging is safer and reliable. Main coils are integrated with compensated coils. Hence size is compact and also cost is reduced .Extra coupling effects are reduced.Here the efficiency is improved. Components used are PIC16F877A, Driver circuit- TLP 250,MOSFET switches, resistance, inductance, capacitance and copper coils which forms the circular loop. In transmitter side for DC TO AC conversion rectifier is used and in receiver side for AC to DC conversion inverter is used. Charge transfer occurs wirelessly between circular loop and air acts as a transfer medium.in double sided LCC compensation ,large volume due to compensation coils is the drawback.*

Key Words: **LCC compensation, wireless charging, extra coupling effects, efficiency ,large volume, transmitter side, receiver side**

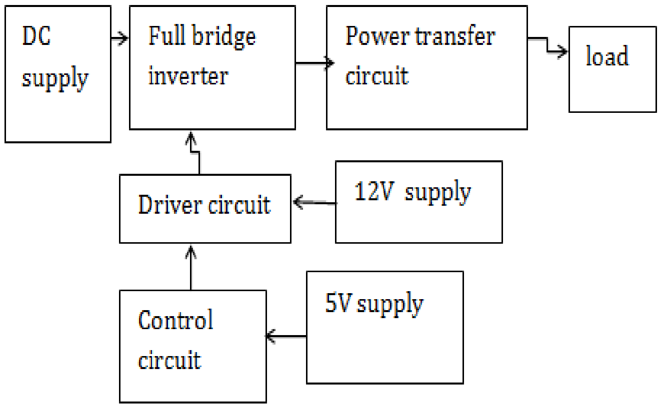
1. INTRODUCTION

This project deals with electric vehicle wireless charging .Electric vehicles are necessary for environment protection .They do not release smoke like vehicles which use petrol and diesel. Increased population results in increased use of vehicles, which release smoke and affects the living beings. In order to make these electric vehicles for public use, the charging system should be more efficient and also cost effective. we are using LCC compensation. Especially single sided LCC compensation ,in which volume is reduced and also efficiency is improved. More attention is paid on increasing the efficiency of wireless charging . A certain voltage given to the transmitter side should be received in the receiver side without any distortion. Otherwise the performance of electric vehicle is disturbed. Major challenge is charging the electric vehicle wirelessly for safer operation. By verifying the simulation results, efficiency of the charging system is improved

1.1 PROPOSED SYSTEM

Main drawback of the existing system is that less efficiency, switching losses and also larger volume. The system consists of a transmitter side and receiver side. Transmitter side consists of a supply, inverter, MOSFET switches, Lf1, Cf1, L1 which forms primary resonant tank. Receiver side consists of L2,C2,Lf2,Cf2 secondary resonant tank, MOSFET switches, rectifier and a battery load. 11v dc supply is given. DC input is transformed to a high frequency AC power using full bridge inverter. Primary resonant tank is tuned to a resonant frequency which is same as that of a switching frequency of a full bridge inverter. In order to receive the same transmitted power on the receiving side, secondary resonant tank is also tuned to a resonant frequency same as that of a primary resonant tank. This type of wireless charging system is straight forward. Advantages are compact design and high efficiency

1.2 BLOCK DIAGRAM



1.3DRIVER CIRCUIT

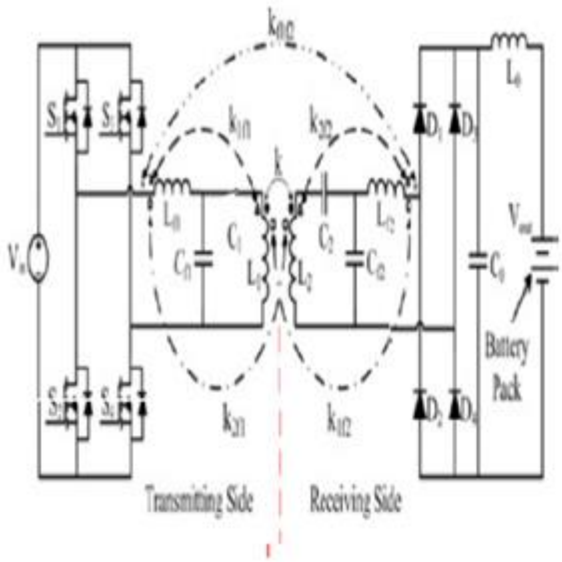
12V supply is given to the driver circuit.it controls the switches in the full bridge inverter. weak signals from the control circuit is converted into strong signals using the driver circuit.

1.4CONTROL CIRCUIT

5V DC supply is connected to the control circuit. control circuit is connected to the driver circuit. Output from the control circuit is connected to the driver circuit

2. CIRCUIT DIAGRAM

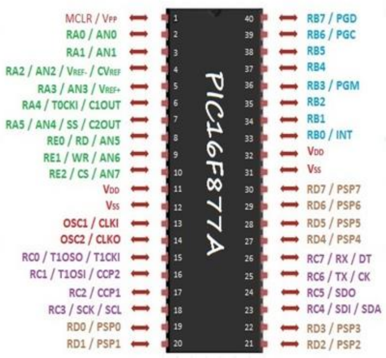
This diagram represents the wireless charging system of Electric vehicles



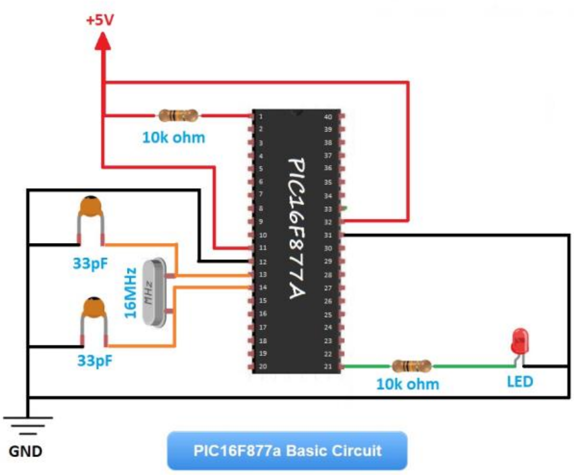
2.1.HARDWARE COMPONENTS

PIC MICROCONTROLLER

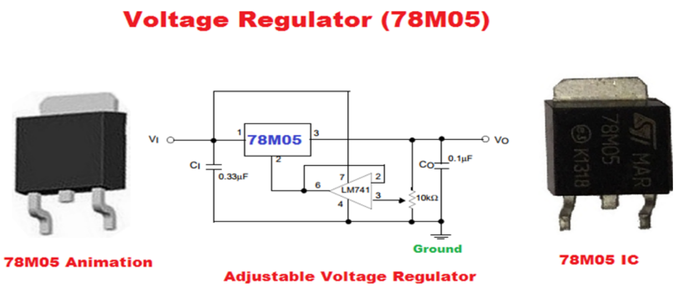
PIC16F877A –less power consumption, coding is easier



PIC16F877A CONFIGURATION

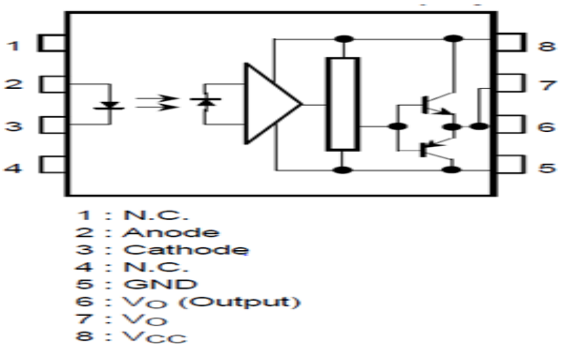


REGULATOR PIN LM7805



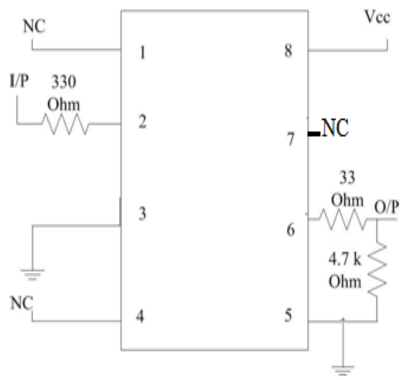
DRIVER CIRCUIT-TLP250

Driver circuit is an electronic component used to control other circuits



DRIVER CIRCUIT CONNECTION DIAGRAM

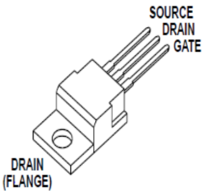
TLP250 consists of light emitting diode and integrated photo detector circuit. It suitable for Gate driving circuit of MOSFET.



Driver circuit connection diagram

MOSFET-PIN

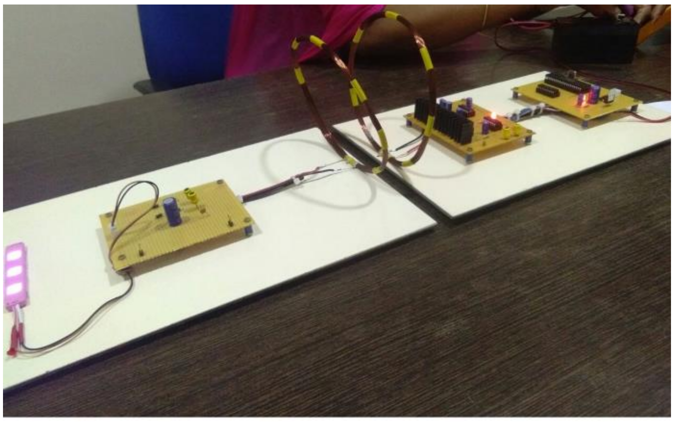
- Nanosecond switching speeds
- Linear transfer characteristics

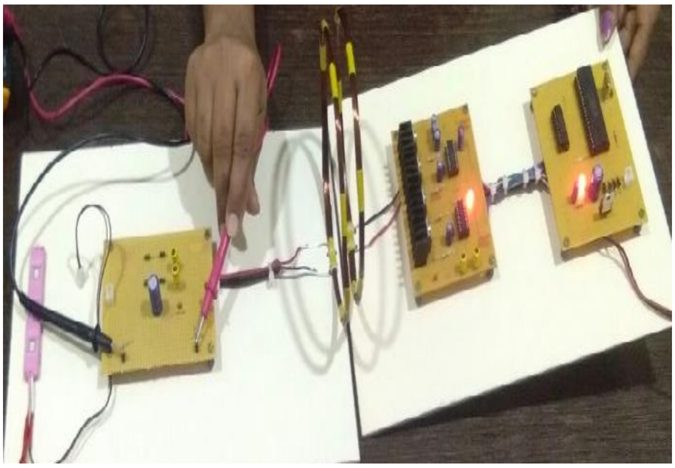


DIODE

3. HARDWARE

LED light strength indicates the amount of power transferred at the output.

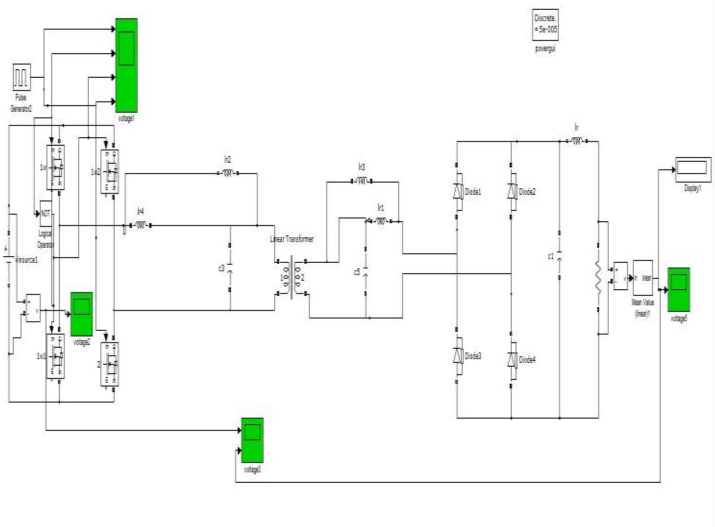




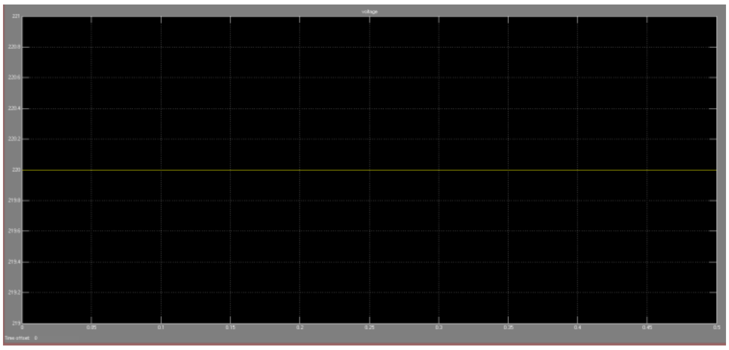
4. SIMULATION

4.1SIMULATION DIAGRAM

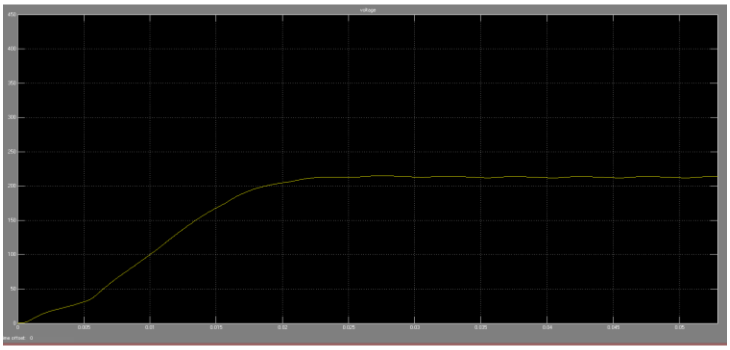
The input given 220V DC and the output power is 212V DC.



4.2 SIMULATION RESULTS



Graph 1-input DC waveform



Graph 2-output waveform

5. CONCLUSION

The wireless power transfer using LCC compensation for high efficiency has been proved using the simulation results. Pure dc is the input and the output is the dc waveform with high efficiency. Simulation is done using MATLAB. The power supplied is transferred efficiently to the battery pack of the electric vehicle. Here the battery acts as a load which stores the power to run a electric vehicle. The power transfer efficiency is 95%.

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