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MAGNETIC TECHNOLOGY BASED FUELESS ECO-CAR WITH SUPER-CAPACITOR CHARGING

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Abstract— **A coaxial Resonance power transfer and distribution apparatus includes a stationary primary conductor and a mobile secondary coil magnetically coupled together to provide for Resonance power transfer there between. A return conductor that is stationary is mechanically coupled to the primary conductor and ensures the position stability of the primary conductor with respect to the moveable secondary coil. The return conductor also includes an air gap in which a support member for the mobile secondary coil is disposed within. The mobile secondary winding includes a high permeability toroidal core that is coaxially disposed about, and spaced apart from, the primary conductor. A multi-turn coil is radially disposed about the high permeability toroidal core. The support member for the mobile secondary winding extends through the air gap in the return conductor to the exterior of the return conductor, where it may be coupled to an electric vehicle.**

***Keywords*-Resonance, MagneticCoils, Super-capacitor, Electrical Vehicle, WiTricity**

I. INTRODUCTION

Electricity is today a necessity of modern life. It is difficult to imagine passing a day

Without electricity. The conventional use of electricity is made possible through the use of wires. However researchers in MIT have devised a means of providing electricity without any wires.

Electric car has been designed a long time ago but it is not being launched in the market because of the problem of battery. Batteries are quite high in price, size and weight and there life is also short about 3 to 4 years. Because of this problem electric car are not successful in market. The Proposed system can overcome this problem by using wireless power transmission technology to give real time wireless power from beneath the surface of road and reduce battery size to minimal. [1]

A green vehicle is a road motor vehicle that produces less harmful impacts to the environment.

We classify this project into 2 parts:

Road-side circuitry: The principle used here is 'Resonance Inductive Coupling' Car circuitry: It works on the principle of 'Super Capacitor Charging.

II. LITERATURE SURVEY

In the late 1800's and early 1900's, at the dawn of the electrification of the modern world, Nikola Tesla, one of the most well known of these scientists, had a vision for a wireless world.

Nikola Tesla's Wardenclyffe tower built on Long Island, NY in 1904. This tower was intended to implement Tesla's vision of transmitting power and information around the world. The tower was destroyed in 1917.

This invention relates to the transfer of electrical power via induction and in particular to a Resonance power transfer and distribution system using a coaxial transformer for electric vehicles. Electrically powered vehicles is useful in manufacturing and warehouse environments for transporting materials in automated material handling of systems [2]

Electric vehicles, however, require sufficient electrical power to have any meaningful mobility and speed. On-board rechargeable energy storage systems, such as batteries, have a significant mass that must be moved in addition to the mass of the material to be transported and the mass of the electric vehicle itself.

The mass of the batteries decreases the range and speed of the electric vehicle and as such reduces the time between battery recharging. Typically, the time between battery recharging depends upon the mass of the material to be moved and the frequency of use. Accordingly, some form of electrical coupling to a power source or power distribution system is required to recharge these systems without requiring the electric vehicles to be taken out of service. Physical contact between a moving electric vehicle and a power distribution

system is often unreliable and has other problems associated with it as well. Brush contact and pantograph are typical prior art methods of coupling a moving electric vehicle to a power distribution system. These prior art methods, however, create a risk of sparking in potentially volatile atmospheres, introducing dirt and grease into an otherwise clean environment, or increasing the risk of a mechanical failure that may disable all or part of the material handling system.

Non-contact forms of power transfer are often used in electric vehicle transportation and material handling systems to provide the primary power to the electric vehicle or to recharge one or more on-board rechargeable power sources. Typically, prior art systems use a form of Resonance power transfer to provide power to the electric vehicle in a non-contact manner. These systems typically are configured as a primary coil and a secondary coil in a primary-void-secondary configuration. The secondary coil,

which is attached to the electric vehicle, is typically placed on the center post of an E-shaped structure.

The primary coil is typically formed by one or more pair of parallel wires that form first and second sides thereof. The current flow in the first and second sides of the primary coil is in opposite directions to generate a magnetic field that is coaxial with the longitudinal axis of the coil. During operation, the center post of the E-shaped structure, on which the secondary coil is disposed, passes between the pair of parallel wires that form the first and second sides of the primary coil. An alternating current is imposed upon the primary coil generating a varying magnetic field that is coupled to the secondary coil, inducing a voltage therein.

This primary-void-secondary configuration, however, allows leakage of the magnetic field and radiates electromagnetic interference (EMI). Leakage of the magnetic field can cause heating of adjacent ferromagnetic structures that can change the physical, electrical, or magnetic properties thereof. EMI can interfere with circuits and data transmission resulting in the loss of time and efficiency.

In addition, the use of a long primary of parallel wires results in a very high inductance. In order to achieve useful power levels high voltages must be used. The use of high voltages, often in the hundred of volts range, increases the risk of accidents and increases the cost of the system due to the components needed to manage the higher voltages.

Therefore, it would be advantageous to have an Resonance power transfer system that contained the magnetic field and reduced EMI and required lower voltages for operation.

The present system is based on two applications: WiTricity

Electric Vehicle charging

The Mitsubishi MiEV Sport shown at the 2007 Tokyo motor show presented the idea of wireless battery charging for Electric Vehicles via a microwave system where the receiving antenna was located on the rear bumper next to the license plate.

Resonance coupling would also work well in this application.

III. PROPOSED SYSTEM

The Resonance power transfer apparatus of wherein the second support element includes a first support section

coaxially disposed about the high permeability core and the multi-turn coil, the support member further including a flange end and a connecting element connecting the first

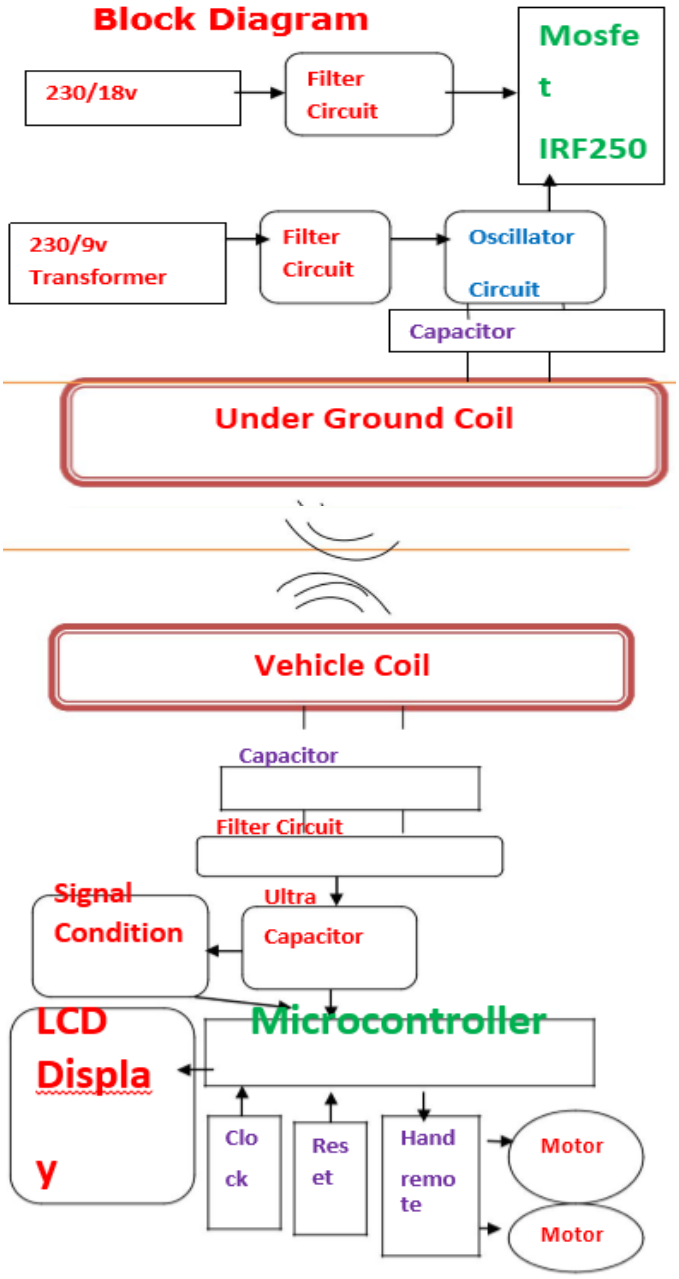

fig 1: Block diagram.

support section and the flange end, the connecting element disposed within the second air gap and extending beyond the

exterior surface, wherein the flange end is spaced apart from the exterior surface. The apparatus of wherein the return conductor is composed of aluminum. The Resonance power transfer apparatus of wherein the first support element is composed of aluminum, the first support element being electrically insulated from the outer conductor. The apparatus of wherein the high permeability toroidal core is composed of ferrite

The Resonance power transfer apparatus of wherein the high permeability toroidal core is C-shaped. It of wherein the second support member is composed of aluminum. The apparatus of wherein the center conductor is a Litz wire. The system of where in the primary conductor is electrically coupled to the power source and receives power there from via a shielded coaxial conductor. Here the primary conductor is electrically coupled to the return conductor via a conductor having a large surface area and a thin cross sectional area. [2]

Many capacitors that you'd have seen in audio circuits have capacitances such as 470uf or 680uf (micro farads). Capacitors used in high frequency RF applications can be as small as 1pf (pico farad). The farad is a measure of capacitance (or storage capacity). They are often used in filtering applications, coupling or decoupling applications, or AC-DC smoothing applications (there are some large caps in your standard AC-DC power supply that acts to400 farad capacitors in series up to 5.4VDC, and feed that voltage through a DC-DC booster circuit. We are also going to employ a digital voltage display that will be able to read both the charge on the capacitor bank, as well as the voltage at the output of the DC-DC booster. [3]

fig 2: car

The design and configuration of a prototype Fueless eco car with Super capacitor charging are reviewed in detail including winding and parameter tuning of coils, sensors, regulator, transformers, etc. The prototype system will demonstrate idea of fast and frequent wireless charging of super capacitor.

The result has been satisfactory with power saving as well as energy saving. The result shows that implementing scheme tends to be a sustainable project development.

The output of astable multivibrator drives the MOSFET circuit to generate the resonance frequency using LC circuit.

F=1/2*3.142*sqrt (L*C) where L=0.025mH and

C=0.47uF F=40 kHz

The voltage regulator, step-down transformer and rectifiers are going to control operation of MOSFET. The coils in the track are having number of turns = 4.

This resonance produced is matched with the resonance circuit places inside the car. So that wireless transfer of power takes place. With the help of this power Super capacitor gets charged, so that car can take round off-track without any help of magnetic field of coils.

The charging level of Super capacitor is indicated on a LCD display screen with the help of microcontroller ATmega16, which has built-in ADC, power, clock, reset.

Super capacitor is used to drive car motor at the rate of around 100 RPM. The car can move in front as well as in reverse direction.

A super capacitor is a high performance “green” electronic component .It is a Physical charge storage, not electrochemical. No dielectric, max voltage limited by electrolyte breakdown voltage

ESR is proportional to 1/Electrode area

C is proportional to Carbon volume.

IV. CONCLUSION

WiTricity's technology is a non-radiative mode of energy transfer, relying instead on the magnetic near field. Magnetic fields interact very weakly with biological organisms—people and animals—and are scientifically regarded to be safe. WiTricity products are being designed to comply with applicable safety standards and regulations. Hence witricity is technology safe. Witricity can transfer power depends on the source and receivers. if it is relatively close to one another, and can exceed 95%.Efficiency is primarily determined by the distance between the power source and capture device, however, the shape may impact the efficiency. it can transfer the power through walls also. Traditional magnetic induction requires that the power source and capture device be very close to one another usually within millimeters to transfer power efficiently. WiTricity technology is based on sharply resonant strong coupling, and is able to transfer power efficiently even when the distances between the power source and capture device are several times the size of the device

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