INCREASING THE RANGE AND EFFICIENCY AND REDUCING THE POSSIBILITY OF ENERGY THEFT IN A WIRTRICITY NETWORK USING VALARIOUS COILS

Abstract: So, how would you react if I say, transmitting electricity or a kind of electric energy through air is possible. Yes people. Get amazed when I speak about the term so called witricity. Our paper is all about the near field technology. This kind of approach is applicable only for witricity networks inside the room or a kind of house like architecture. This is similar to the wifi that we use in home. We have used the resonant coupling induction method which is a type of coupling the transmitter and the receiver. The main thing to be noted here is that at resonance maximum power can be transmitted but

In today’s trend of witricity researchers could transmit a maximum energy of 40%. Mitians have proved themselves with this resonant coupling method transmitting the electrical energy over a distance of 2m and glowing a 40w bulbs. 40% (thumbs down). Yes here we are all about to present ourself how we can increase the efficiency of transmission of electrical energy. Apart from efficiency the range of transmission plays an important criteria in the witricity networks. We have proved mathematically and experimentally to obtain a efficiency of 72.5% and a range of 6.25m (3.75 metre Practical cases). Using the idea of replacing the source coil with the valarious coils. (the valarious coils are available in market). We found certain specific features of this valarious coil that could find special results in witricity networks. People ask me in doubt wont there be a huge possibility of huge power theft when you try to transmit energy though air. We have come out with a model that could prevent or avoid the possibility of energy theft. So all what we say is that witricity is not an imminent vanguard. It have bloomed to its peak and still growing.

Keywords: Witricity, Resonant induction coupling method, electromagnetic induction, valarious coils, IMN(impedance matching networks).

I. INTRODUCTION

As the name suggests witricity refers to the transfer of electric power without the using of conventional cables or wires over a far or near field distance. The obstacle of today’s modern power system has high transmission loss, i.e These losses contribute about 40 percent of the power generated. Thus the current day transmission system has efficiency of 70 to 75% only. The resistance offered by the transmission lines are higher considering for a long distance so they account for 27-31% transmission losses. Recent research is based on changing the conductor with a conductor of resistance negligible. Witricity neglects the need for the transmission losses thus the systems stability and efficiency is highly increased. Every department of science is aimed at finding the imminent vanguards for the people. Hence with electric power systems must be updated with recent trends. For this criteria the power transfer without cables or conventional wires may be considered as the imperial alternative for transmission model.

II. ORGINATION

Wpt is not an envision idea, it was first first manifested and experimented by sir Nicola Tesla in the 19th century. The prescription used by him is the emi (electro magnetic induction). In 1964 William Brown used the microwave model for transmitting power to the drones and ingrafts (flying object). In 1974 Bill Brown disseminated 25kw power over a range of 0.95 mile with the efficiency of 74% without using conventional cables or wires. Researchers and scientists are still approaching the dead end of witricity networks considering the charging of a device it takes place in the following steps:

1. The resonating coil is charged from the supply main. This coil creates a magnetic field. This is similar to that creation of magnetic field in the primary circuit of the transformer.
2. When the load coil (receiver coil) is placed near the resonator coil, the magnetic flux linkage occurs between these coils.
3. This secondary current charges the battery or drives the load.

Simplest representation of a wpt network

III. POSTULATES OF WITRICITY

There are various methods of establishing a witricity network. This paper is concerned about the resonant coupling method that uses the RESONANCE CONDITION. The phenomenon of resonance is an physical phenomenon every object have their own resonant frequency, if suppose the external environments frequency matches with the frequency of the object resonance occurs. Resonance results in transformation of energy. Example: If an opera sings at a higher frequency matching with the frequency of the material (glass) the glass is shattered into pieces. This shows that the vibrational energy
of the material is transformed into kinetic energy. Similarly in case of electrical resonance the magnetic energy is converted into electrical energy and vice versa. The main advantage of resonance is that magnitude and the magnetic field effect is increased adversely. Resonance occurs only when the difference between input and output impedances are nulled to zero. Resonance occurs due to the collapsed magnetic field. The T.F( transfer function ) is formulated for the network. The angular frequency of resonance is given by

\[ \omega = \frac{1}{\sqrt{LC}} \]

where \( \omega = 2\pi f \), in which \( f \) is the resonance frequency in hertz,

\( L \) is the inductance in henries, and

\( C \) is the capacitance in farad

When general ANSI standards are used.

**HOW WE WOULD BE THE FUTURE WITH WITRICITY (PROPOSED TECHNOLOGY)**

(A). **valarious coils**

Quite speaking frankly, valarious coils are not available in market. So how did we get the idea of using valarious coils. Here comes my answer. The spark for this idea was obtained from "GAME OF THRONES". Seems weird right. Yes.

The Valarrian steel was the reason, when googled about the Valarrian steel we could obtain serious worth values of that metal. we decided to make our transmitter coil with that valarious coils. the difference between the normal conventional copper coil and valarious coil is that it contains whirls instead of turns. which serves as a major advantage for increased magnetic field density. the interference is reduced by metamaterials that is coated over the valarious coils. there are wide variety of metamaterials we selected silver nitrate as our metamaterial as it is comparatively cheap and best suited for this application. People do ask me doesn’t Lenz law affect the emf induced emf in the coil. all the answers for these questions is those metamaterials.

(B) **proposed orientation of the valarious coils**

We have proposed a model in which the valarious coil is present at the centre and the receiver coils are surrounded all over the valarious coils. The no of devices that could be connected to the WPT network depends on the number of the receiver coil around the valarious coil. As the size and the load capacity of the load varies the proximity of the coil to the source coil differs and the centralized algorithm need to be used to establish a perfect WPT network. 360 degree orientation of the coil is used up the main advantages of using this kind of orientation is that. The use of valarious coil for the transmitter coil. Proximity of the coil is increased. Hence flux produced links around 360 degrees. Less leakage flux. Range of the transmission is improved. So flux distribution is uniform. No of devices connected is increased. Efficiency of the system is improved. Metamaterials are not needed.

Typical representation of **Proposed orientation**

**IV. OBSERVATION:**

The observations were made on the basis of creating a miniature model for a witricity network using valarious coils:

The results of observations were that we were able to achieve an **efficiency of 72.5%** which is 32.5 percent higher than the current day witricity networks.

Our paper revolves around the concept of using the valarious coil in place of the source coil. Even though they are bulky and heavy in weight, they could considerably increase the efficiency and range of span. The valarious coil are of great use that they have the basic nature of metamaterials so that they do not need a separate metamaterials for reducing interference. The valarious coil has large number of turns and the maximum number of devices that could be connected Depend upon the whirls in the coil. The valarious coil has large number of turns and the maximum number of devices that could be connected Depend upon the whirls in the coil. The range is highly improved that is 3.25 meter (under...
practical cases which is 1.25 metre far from the best of the witricity networks.

V. ADVANTAGES

Quite speaking frankly, we were able to achieve a greater efficiency at a cost efficient manner. But the range of transmission depends on the size. Turns of the vararious coil. Transmission can be possible if there are any obstructions like wood, metal, or other devices were placed in between the transmitter and receiver.

No requirement for the conventional power cables. They don’t interfere with the communication signal or the radio waves.

Emw is tunneled through space and thus the power wastage or loss is minimized to zero. Efficiency: Resonant system = 10^6 efficient of electromagnetic induction.

ADVANTAGES OF USING VALARIOUS COILS

- Efficiency can be reached up to 80 percentage
- No of devices is bounded but it is based on the number of whirls in the vararious coil
- Range increased up to 3.25 metres
- Interference between signals is diminished
- Multiple receiver coil can be connected to serve a single high power demanding load
- Power can be transmitted from one room to another room

VI. SHORTCOMINGS OF WIRELESS ENERGY

Many companies and various institutions (that includes Intel and MIT) are involved in a race to be the first to release marketable wireless energy packages even though there are comprehensive disadvantages in witricity.

Size: the vararious coil is huge in size and hence the size of the instruments need to be increased this decreases the handling capacity of the gadgets.

Range: range as told above, is of very less distance which is not even high enough to get connect with distance above 2 metre.

Efficiency: this ensures only 40 to 80 % efficient, thus comparing with normal method this proves to be less efficient.

Cost: the cost is definitely an issue it takes around 62k bucks for establishing a witricity network in home. Thus this proves to be highly costly.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Diameter Of the sc coil (in cm)</th>
<th>Diameter of the rc coil (in cm)</th>
<th>No.of turns in sc coil</th>
<th>No of turns in rc coil</th>
<th>Frequency of operation</th>
<th>Distance between coils (in m)</th>
<th>Leds response</th>
<th>Operating voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15</td>
<td>12</td>
<td>22</td>
<td>20</td>
<td>20 hz</td>
<td>2.25</td>
<td>No glow</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>15</td>
<td>12</td>
<td>22</td>
<td>20</td>
<td>200khz</td>
<td>2.25</td>
<td>Dim glow</td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>15</td>
<td>12</td>
<td>22</td>
<td>20</td>
<td>250KHZ</td>
<td>2.25</td>
<td>Bright</td>
<td>20</td>
</tr>
</tbody>
</table>

DISADVANTAGES OF USING VALARIOUS COILS

- Not sufficient research analysis have been provided
- Recquirement of more receiver coils that increases the cost
- Insulation is required for each coil to reduce interference
- This proves to be costlier.

VII. MATHEMATICAL PROOFS:

Range (L) = 3.96 (mathematically)
3.15 (practically)

\[ L = \frac{M_0 A_1 A_2 N_1 N_2}{\mu} \]

\[ L = \frac{4\pi^2 \times 10^{-7}}{2\pi} \times 20 \times 20 \times 0.1 \times 0.1 \]

\[ L = 4 \times 10^{-13} \times 4 \times 10^3 \times 10^{-12} \times 10^{-2} \]

\[ L = 3.96 \text{ m} \]

For range of operation:

\[\frac{L}{3.96 \text{ m}} \rightarrow \text{Theoretical Value} \]

Experimental Value = 3.16 m (radially)
Efficiency = 72.5 %

<table>
<thead>
<tr>
<th>Material</th>
<th>Range and brand</th>
<th>Cost (INR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valarious coil</td>
<td>23 turns (0.1m²)</td>
<td>3,400 Rs</td>
</tr>
<tr>
<td>Decade capacitance box</td>
<td>ELC 05 – box</td>
<td>30,215 Rs</td>
</tr>
<tr>
<td>Decade resistance box</td>
<td>9999.9 precision box type</td>
<td>2,820 Rs</td>
</tr>
<tr>
<td>Decade inductance box</td>
<td>Zeal zmib type</td>
<td>27,492 Rs</td>
</tr>
<tr>
<td>IMN</td>
<td>RS4</td>
<td>1,420 Rs</td>
</tr>
<tr>
<td>Rectifier</td>
<td>Sunrex</td>
<td>2,759 Rs</td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td>68,106 Rs</td>
</tr>
</tbody>
</table>

IX. OUR FUTURESCOPE:
1. Power line transmission with valarious coils
2. Enhancing security with Static System Component based Dynamic Key Generation
3. Intertwirled valarious coils

X. SOLUTION FOR POWER THEFT:
This algorithm can make the system to detect if there is an power theft. This can be done using the zigbee module or normal wireless method. We have been working on this algorithm to ensure that no power theft occurs in a wpt network, even if it occurs, it will be intimated to the consumer regarding the unauthenticated use of power.

Flow chart for theft like
Direct tapping

Flow chat for meter and alarm indication:

XI. CONCLUSION:
As of our knowledge we have invoked the valarious coils into
the witricity concepts for better load capacity and better range. Witricity method is too recent and too focussed to have a conclusion. By our proposed methodology and orientation of coils the efficiency, range could be increased and the size of the system could be reduced.

XII. ACKNOWLEDGMENT:

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REFERENCES: