

INCREASING THE RANGE AND EFFICIENCY AND REDUCING THE POSSIBILITY OF ENERGY THEFT IN A WITRICITY 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 thourgh 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

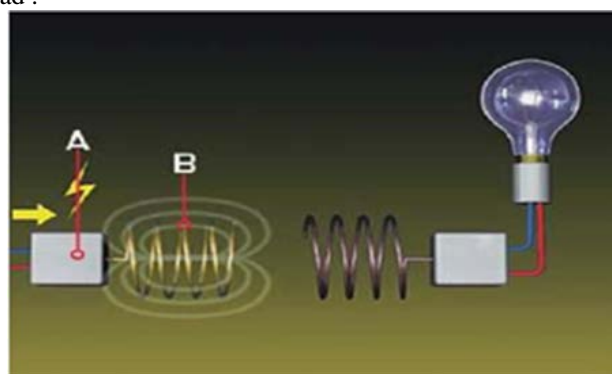
As the name suggests witricity refers to the transfer of electric power without the using of conventional cables or wires over a far or near field distance. The obstacle of todays modern power system has high transmission loss . i.e These losses contribute about 40 percent of the power generated . thus 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 prescript used by him is the emi (electro magnetic induction) . In 1964 Willam 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 concetional cables or wires . reasearchers 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. Resosnace 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 genral ansi standard 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 valarian steel was the reason, when googled about the valaryian 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 they 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 comparitely 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 .



TYPICAL REPRESENTATION OF VALRIOUS COILS

(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 prosimity 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 improvedSo 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 interefernce .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 witrlicity networks .

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

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

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

for establishing a witrlicity network in home .
Thus this proves to be highly costly .

V. ADVANTAGES

Quite speaking frankly , we were able to achieve A greater efficieny at a cost efficient manner But the range of transmission depends on the size Turns of the valarious 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 minized to zero .
Efficiency Resonant system = 10^6 efficient of electromagnetic induction

ADVANTAGES OF USING VALARIOUS COILS

- Efficiency can be reached upto 80 percentage
- No of devices is bounded but it is based on the number of whirls in the valarious coil
- Range increased upto 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 eventhough there are comprehensive disadvantages in witrlicity

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 interefence
- This proves to be costlier

VII. MATHEMATICAL PROOFS :

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

mathematical proof for range of separation .

$$L = \frac{\mu_0 \mu_r N_1 N_2 A}{M}$$

$$L = \frac{4\pi \times 10^{-7} (1) \times 200 \times 200 \times 0.15^2}{2 \times 10^{-3}} \text{ in metre}$$

$$L = \frac{4\pi \times 10^{-7} \times 4 \times 10^4 \times 0.15^2}{2 \times 10^{-3}}$$

$$L = \frac{4\pi \times 4 \times 0.15^2}{2}$$

$$L = 3.96 \text{ m} \rightarrow \text{Theoretical Value}$$

Expsimental Value = 3.16 m (radially)

Efficiency = 72.5 %

Mathematical proof for efficiency :

$$\eta = \frac{\text{Output power}}{\text{Input power}} \times 100 = \frac{P_{out}}{P_{in}} \times 100$$

$$P_{out} = V_{out} \times I = \frac{V_{out}^2}{(15 \times 10^{-3})^2}$$

$$P_{out} = \frac{(15 \times 10^{-3})^2}{R} = \frac{(15 \times 10^{-3})^2}{20000} = 0.29 \times 10^{-4}$$

$$P_{in} = V_{in} \times I = V_{in} \times \frac{V_{out}}{R}$$

$$= \frac{V_{in}^2}{\sqrt{R^2 + (15 \times 10^{-3})^2}}$$

$$= \frac{V_{in}^2}{R} = \frac{20^2}{1000} = 0.4 \times 10^{-1}$$

$$\text{efficiency } \eta = \frac{P_{out}}{P_{in}} = \frac{0.29 \times 10^{-4}}{0.4 \times 10^{-1}} \times 100 = 0.725 \times 100 = 72.5\%$$

Handwritten notes:
 $R = 20k\Omega$
 $I = 75mA$
 $C = 10\mu F$

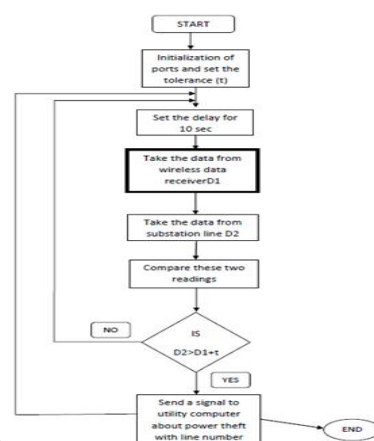
IX. OUR FUTURESCOPE :

1. Power line transmission with valarious coils
2. Enhancing security with Static System Component based Dynamic Key Generation
3. Intertwiled valarious coils

X. SOLUTION FOR POWER THEFT :

This algorithm can make the system to detect if there is a 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 :



VIII. BILLING OF MATERIALS (BOM):

Material	Range and brand	Cost (INR)
Valarious coil	23 turns (0.1m2)	3,400 Rs
Decade capacitance box	ELC 05 – box type	30,215 Rs
Decade resistance box	9999.9 precision box type	2,820 Rs
Decade inductance box	Zeal type zmib	27,492 Rs
IMN	RS4	1,420 Rs
Rectifier	Sunrex	2759 Rs
	Total :	68,106 Rs

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:

I would like to thanks to our HOD (Mr.v.Arulalan), staff of panimalar engineering college for his kind support to do our research work . we like to Thank the SCHULZERS coil manufacturer for their patience in understanding and making our dreams become a reality .

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