Wireless Power Transmission to Recharge and Monitor the Pacemaker Battery

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Abstract-The pacemaker batteries has a life time of several years, which must be replaced after some time period. The only way of battery replacement is through surgery. So, it affect the patient's normal life and it also makes the situation worse if the patient faces any health emergencies. For satisfying the patients and also reducing burden of doctors, the batteries are recharged through Wireless Power Transmission (WPT) technique, which completely eradicate the risk of consecutive operations for replacement. Here the battery is charged by an internal secondary circuit which is electromagnetically connected with the external primary circuit by mutual induction. For controlling the power transmission, we use Atmega 328P microcontroller which transfer the power through the motor driver circuit. By using this technique many pacemaker batteries are recharged at a time which is time reducing and cost reducing.

Keywords: WPT, Mutual induction, pacemaker battery.

I. INTRODUCTION

After the invention of batteries, the possibility of carrying current is achieved. The 1wireless power transmission technology has been blooming in different fields day by day. In the field of biomedical instrumentation, the replacement for the pacemaker is done only through surgery, which is a tedious process. By implementing this technology, we can recharge the batteries within few minutes while patient listening to his/her favourite songs or a movie. Here we use a technology using microcontroller to control the rate of transmission. If we integrate this circuit with GSM or ZIGBEE, we can acquire the information about the charging condition of the battery via a phone or a desktop. Nicola Tesla developed the technique of transmitting power by means of electromagnetic induction.

The back law of the initial pacemaker is the replacement of batteries through surgery. The life time of battery is also limited to 10-15 years. To overcome this draw backs. We developed a project to recharge the battery without surgery.

II. LITERATURE SURVEY

When patient's heart beats too slow or stop pacemaker gives electrical stimulation to the heart. Pacemaker is implanted over the heart and power is supplied by the pacemaker battery which is placed under the skin of patient's collar bone. The battery is only replaced by surgery.

Wireless power transmission circuit converts AC 230 volt to AC 12 volt, 20 KHz. The output of the air core transformer power is transmitted to the pacemaker battery. [1].

III. BLOCK DIAGRAM

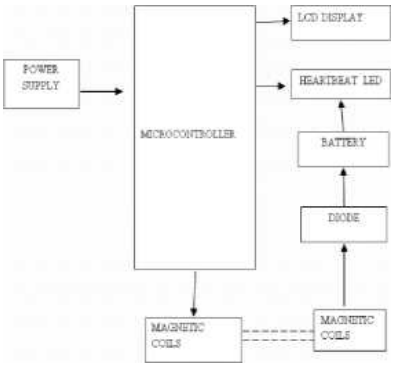

Fig. 1: Block diagram of WPT.

IV. TECHNIQEUS FOLLOWED

From the main power supply, by using a step down transformer 12v power supply is given to the microcontroller. Here Atmega 328 microcontroller is used. The program to regulate the circuit is fed in by Aurduino software. For reference we have connected an LED to indicate the heart rate for better understanding about the

pacemaker. Microcontroller is used to select the voltage requirements for the active and passive components. The pins PB0, PB1, PB2, PB3, PB4, PB5, AV_{CC} , Ground are connected to the 16*16 display. The pins PD0, Ground is connected to the reference LED which indicates the heart rate. PD3-IN3, PD4-IN4, 5V to +5V, 12V to +12V are connected from the microcontroller to the motor driver circuit. The pin PC5 is connected from microcontroller to regulator. After setting the values of transmitting frequency is fed to the primary coil in which fluctuation occurs which results in production of the electro motive force in the sme magnitude in the secondary coil by means of mutual induction. Since the battery is DC, the received AC is converted into DC current by a bridge rectifier circuit. Using filters, pulsating DC is converted into linear DC and by using a regulator circuit the required voltage is fixed. This regulated voltage the fed to the rechargeable battery.

V. RESULT

By this project, we avoided the risk taken while operating the patient.

Fig. 5.1Result.

By implementing this project, once a pacemaker inside the patient body, he/she will be free from operations and be like a normal person without any fear of life and also the status of the battery can be monitored without fail.

VI. CONCLUSION

Thus, we added an upgraded version of pacemaker in the field of biomedical instrumentation by using a simple circuit which create a massive outbreak in the area of medical implants.

The controller is not accurate in certain contains and due to these loses in the transmission and receiver circuits, efficiency of the project is not in its fullest. If we overcome these drawbacks, then the outcome of this project is with accuracy.

In this project which is completely eradicate the risk of patient and burden of doctors. The power is transmitted with help of air core transformer for rechargeable pacemaker battery is 3-4V. In future, the circuit is miniature and placed in the patient body.

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