“WIFI AMBIQUATION TO CHARGE PACEMAKER”

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Introduction:

Wireless charging is any of several methods of charging batteries without the use of cables or device-specific AC adaptors. Wireless charging can be used for a wide variety of devices including cell phones, laptop computers and MP3 players as well as larger objects such as robots and electric cars. There are three methods of wireless charging: charging, radio and charging. Inductive charging is used for charging mid-sized items such as cell phones, MP3 players and PDAs. We are introducing a concept for charging a heart pacemaker with the help of a wireless amplifier; this will not only reduce the cost but also will save time in re-installing the pacemaker in the patient’s body. The charge produced by the pressure sensor is of the order of few Pico-coulombs per psi and has very high output impedance, thus usual instruments like oscilloscope cannot be calibrated directly with the sensor. Hence there is a need to convert this high impedance charge to low output impedance voltage which is proportional to the charge produced by the pressure sensor and further amplify this voltage to get a desired range. This is done by using a charge amplifier to achieve an output which can be easily monitored by an oscilloscope. Contrary to what its name may suggest, a charge amplifier does not amplify the electric charge present at its input, it simply converts charge to voltage. In inductive charging, an adapter equipped with contact points is attached to the device's back plate. When the device requires a charge, it is placed on
a conductive charging pad, which is plugged into a socket. Radio charging is used for charging items with small batteries and low power requirements, such as watches, hearing aids, medical implants, cell phones, MP3 players and wireless keyboard and mice. Radio waves are already in use to transmit and receive cellular telephone, television, radio and Wi-Fi signals. Wireless radio charging works similarly. A transmitter, plugged into a socket, generates radio waves. When the receiver attached to the device is set to the same frequency as the transmitter, it will charge the device's battery. Resonance charging is used for items that require large amounts of power, such as an electric car, robot, vacuum cleaner or laptop computer. In resonance charging, a copper coil attached to a power source is the sending unit. Another coil, attached to the device to be charged, is the receiver. Both coils are tuned to the same electromagnetic frequency, which makes it possible for energy to be transferred from one to the other. The method works over short distances (3-5 meters).

**Objectives:**

Biomedical Implants require clean and medically safe equipments to perform their operations. Earlier implants such as pacemakers sourced their power from small lithium ion batteries. While this solution allows for the operation of the implantable device without a wire connecting the internal and external circuitry, limited battery life causes the impracticality, health risk and expenses of operating on patients for the mere purpose of replacing the battery. This is an overview of current techniques in the field of biomedical implants, including the type of theory behind switch mode power amplifier, techniques in transmitting between two coils and the types of rectification employed in implantable devices. System optimization can be achieved in all three sections. Class E amplifier provides a robust and highly efficient means to transmission.

**Methodology:**

Biomedical Engineering can be seen as a mix of medicine, engineering and science. In fact, this is a natural connection, as the most complicated engineering masterpiece is the human body and it is exactly to help our ‘body machine’ that Biomedical Engineering has its niche. The charge produced by the pressure sensor is of the order of few Pico-coulombs per psi and has very high output impedance, thus usual instruments like oscilloscope cannot be calibrated directly with the sensor. Hence there is a need to convert this high impedance charge to low output impedance voltage which is proportional to the charge produced by the pressure sensor and further amplify this voltage to get a desired range. This is done by using a charge
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**Fig.: Block Diagram**

Wireless power is most commonly transferred with inductive links, which comprise primary and secondary coils that operate together as a weakly coupled transformer. The structure of each coil determines several factors in the coil’s ability to inductively transfer power. It is important to consider the way in which different coil structures produce different field patterns. Aspects which influence the transfer of power with inductive coil involve coil size, separation, shape and performance at different orientations. It is more efficient to
transmit wireless power at lowest frequencies and as the complexity of implants is increasing sophistication. Rectification is an important element of wireless power transfer in that it’s vital to capture and utilize the power received at the secondary coils of the implant. In higher power non- biomedical applications, rectification is a straightforward task. Diode bridges and voltage bridges and voltage regulating units are typical examples. However implementing this at higher frequencies with lower power level is difficult.

**Results And Conclusions:** This project has been presented an over view of current techniques in the field of wireless power transfer technology for biomedical implants, including the types and the theory behinds switch mode power amplifiers, techniques in transmitting between two coils, and the type of rectification employed in implantable device due to zero voltage and voltage derivative switching. The magnetic coupling between primary and secondary coils can be analysis using full wave simulator. This enables one to achieved optimized coils design after taking tissues properties and device oriented into an account. The arraying technique of primary coils has shown promising results in eliminating blind spots. Several interesting solutions are developed for rectification of received power for implants, including creative ways of avoiding voltage drops across diode, which are fundamentals elements of rectification. Improvisation and modification is the name of the game in today’s world, even though it is highly risky to make such a device work practically but with the advancement in the technology and skilled labors we can reach great feats. Hence this will also give a new vision to the way people look at charging of devices such as a pacemaker which is embedded in ones body without much hazard and will also be cost friendly. To achieve new heights in the field of Bio-medical field. We have a mission to build a wireless amplifier which will charge a pacemaker.

**Scope for Future Work:** The scope of Wi-Fi Ambiquation or universal frequencies can extent great help to other bio- medical implants such as ear aid, asthma pods etc. By the use of universal frequencies such as Wi-Fi, Bluetooth, Gps we can bridge the distance between a painful processes which is taking place in the current time. The future of pacemaker is also very bright as in the current format a patient even after installing the pacemaker needs to undergo operation after a given period of time so as to recharge the batteries inside the pacemaker. This concept of radiating frequency will be a great advantage to the world. However there has to be research carried on so that the harmful radiations along with the useful ones does not affect the body adversely. New techniques have to be found so
as to save the human body from getting affected even when the pacemaker is operating. As we know human body is a phenomenon of complexion and even a small problem occurred due to unwanted frequencies might turn out to be destructive. The work must be carried on the sending device mainly so as the sending device will induce voltage to the secondary coil and if the radiation send is not controlled properly things may turn worse form bad. As we know improvisation and modification is the name of the game in today’s world, even though it is highly risky to make such a device work practically but with the advancement in the technology and skilled labors we can reach great feats. Hence this will also give a new vision to the way people look at charging of devices such as a pacemaker which is embedded in one’s body without much hazard and will also be cost friendly.