Study on Wireless Power Transfer Technology toward the Application for Cardiac Pacemaker

Li, Mengyang

At present, at least 5 million people in the world rely on cardiac pacemakers to maintain their life, but the batteries can generally work for 5~7 years. Therefore, in order to avoid to bring new pain and economic burden for the patients to replace the batteries for the implanted devices (pacemaker etc.), a new technology of wireless power transmission(WPT) to the pacemakers were explored and studied in present project. And to obtain the fundamental data for future application in the human body with different fat or thin levels, the effect of different medium or biological tissue on the WPT performance(WPTP) were investigated. Based on the principle of magnetic coupled resonance, the multifunctional and small WPT system (WPTS) with coils on printed circuit board(PCB) was fabricated, which achieved power transmission despite the presence of wood, building materials, water, or biological tissue (typically 10cm thick agar and 6cm thick lean pork) between the PCB coils, and successfully wireless charged the pacemaker. Then the influence of thickness and conductivity of salt solution, agar (simulated body tissue), pork on WPTP were quantitatively detected. It reveals that in the air, the WPT efficiency is about 45%, and the maximum power transfer distances is 20cm. But the brine and agar have a noticeable effect on WPTP when they are near to the coils. It shows that for the same kind of medium, the WPT efficiency decreases with the conductivity; and the agar has stronger ability to block the magnetic field passing through than the brine.