Abstract

High Coverage Inductive Interface for Implants in Small Animals

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I. Abstract

In Biomedical Engineering, inductive wireless power transfer (IWPT) has been investigated by many researchers to charge active implantable medical devices (AIMDs) since IWPT is safe and avoids the implementation of cables, preventing infections through the skin and movement limitations.
This research develops a high coverage inductive interface to build a cage that works as a tool to acquire and study the neuronal activity in small animals. The coverage is constituted by big transmitter coils in order to charge homogeneously implants in free-moving small animals, where the receiver coil is fully implanted. Different approaches, as the implementation of bigger coils, segmentation technique, multicoil array were combined to maximize the covered area and optimize the power distribution homogeneity as well as the power transfer efficiency.
In this study, it was found that segmentation technique significantly mitigates the power losses. Another important finding was that larger distances between transmitter and receiver coils decreased the misalignment sensitivity. This is essential for the free movement of small animals.
Finally, after testing three different arrangements of multicoil arrays, it was concluded that overlapped coils provided the most homogeneous magnetic flux over the inductive surface compared with separated and adjacent coils.

II. Image

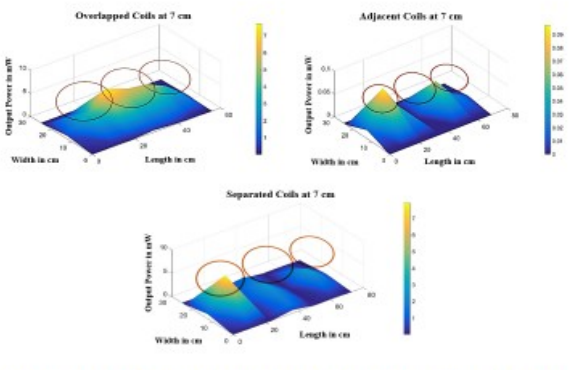


Figure 1: Multicoil arrays for inductive interface.

III. References

1 D. Nayak et al., 'HHS Public Access - Power Loss Analysis and Comparison of Segmented an Unsegmented Energy Coupling Coils for wireless Energy Transfer', 2016.

2 F. Kohler et al., 'Closed-loop interaction with the cerebral cortex: a review of wireless implant technology', 2017.

3 S. A. Mirbozorgi et al., 'A Smart Cage With Uniform Wireless Power Distribution in 3D for Enabling Long-Term Experiments With Freely Moving Animals', 2016.

4 S. C. Tang et al.'Intermediate Range Wireless Power Transfer with Segmented Coil Transmitters for Implantable Heart Pumps', 2017.

5 A. G. Lazaropoulos, 'Practical Coupled Resonators in Domino Arrangements for PowerTransmission and Distribution : Replacing Step-Down Power Transformers and Their Branches across the Power Grid', 2013.

IV. Biography

Ana Domingues has completed his Mater at the age of 23 years from University of Minho (Portugal), in Erasmus context in University of Freiburg (Germany). She worked almost one and half years as Biomedical Engineer.
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