

AIMS² Research Project in Electrical Engineering

Research Duration: Fall 2017 – Spring 2018

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Title of Project: **Experimental Characterization of Low-Profile Wireless
Power Receivers for Pediatric Circulatory Blood Pumps**

Goals and Objectives of the Project, Expectations and Outcomes

Heart failure (HF) affects approximately 12,000-35,000 children each year in the United States. Blood pumps that provide circulatory support for many adults suffering with HF have allowed them to survive until they receive a heart transplant. One area for improving the implantability of blood pumps for children is the use of wireless powering systems. These systems eliminate the power cord connecting the implanted blood pump to the external power supply. In adults, wireless power systems have decreased the number of power cord-related infections and have improved patient outcomes after pump implantation. We propose the development of low-profile wireless power receivers to improve the implantability of blood pumps for children. In this research students will study the feasibility of using flexible printed circuit boards to design implantable receivers for wirelessly powering a child-specific blood pump (Jarvik 2000 Child). This research will require students to use finite element modeling software to predict the magnetic interaction (mutual inductance and coupling) between transmitting and receiving coils and to design, fabricate, and test various coils. Students will use modeling software like Finite Element Method Magnetics (FEMM) and printed circuit board layout software like Eagle to design transmitters and receivers. Coils will be fabricated using basic etching procedures. Students will also use a network analyzer to characterize the wireless receivers.