Implantable/wearable medical devices are very important in the medical field and health care system. They allow us to better understand what is going inside the body of a person and accurately monitor their health conditions. This communication is achieved wirelessly and can be created using different methods. Some examples of such methods include inductive coupling, backscattering, and radio frequency (RF) systems. An inductive coupling is a short-range communication technique achieved via mutual inductance between primary and secondary coils. Radiofrequency (RF) communication links can be implemented using miniaturized antennas to achieve higher data rates and a reasonable communication range.

In these results, the inductance values of the primary and secondary coils are same. However, because the coupling coefficient is $\kappa=0.5$, the receiver end obtains half of the power that was transmitted towards it.

Radiofrequency Communication System:
In a RF communication system, the signal between the transmitter and receiver is sent through an electromagnetic wave. As the distance between the two is greater, the signal to one another becomes weaker and weaker until nothing is received. To achieve a greater connection between the two ends, amplifiers are placed to allow the signal to be increased as required. In doing so, the signal will not be as weak as originally made.

Results of the RF simulation are below:

As the chart shows, the closer the communication systems are to one another, the greater the signal output. The lower the frequency, the greater the signal output. As they all start at .1 m away, the 400 MHz received the highest output at 2.4 V, higher than the other two.

My professors research focuses on what can be the best type of medical devices to understand what is wrong with a human being’s health and how to handle them. Technology advancements are allowing for smaller and smaller bio-chips to be inserted into the human body that will also consume less power. This would benefit the consumer and environment as it will be more efficient and need less parts to make.

My advice for future SHINE Students would be to not pressure yourself. Make a plan before hand step by step and follow it through. Don’t try doing too much as it’ll feel like too much. Work hard at your project but enjoy the experience as it goes on.

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