Wireless Power Harvester

Summer Research Project
Faculty supervisor: Mohamed A. Salem
May 24 – Aug. 10, 2018

Motivation:
In our evermore wireless-connected world, a significant amount of power is wasted in ambient electromagnetic energy - e.g., consider the WiFi access point in Sal 2004; its ∼ 400 mW radiated power practically goes unused. Wireless power recycling by capturing some of the ambient radiation and making it available for reuse has thus become an interesting technology to potentially solve the wasted ambient energy problem.

Objective:
This project aims to design, implement and test a power harvesting rectenna (rectifying antenna) in the ISM (industrial-scientific-medical) microwave band. The rectenna captures and converts the RF (radio-frequency) signal to DC voltage. The efficiency of capturing and converting ambient electromagnetic energy is a crucial parameter that needs to be carefully considered during the design of the project.

Student Development:
The successful candidate(s) student will work with CAD (computer-aided design) tools and electromagnetic full-wave simulation software as well as fabricate and test a functioning prototype. I will provide guidance through the technical part and provide relevant material (software and hardware), as well as needed training for fabrication and measurement equipment. The project offers an excellent opportunity to engage in research and development, as well as an opportunity to publish your research. Senior students: this project may be expanded to be your senior design project.

Deliverable:
Upon completion of the project by August 10th, a poster summarizing the process and results will be generated. The results will be disseminated through various venues, including Science Symposium (2019) and Graduate Expo (2019). I plan to extend the work and submit a research paper co-authored by the research student(s) to a relevant journal (e.g., IEEE Antennas and Wireless Propagation Letters).

Financial Support:
Successful candidate student(s) will be awarded $1,000 as stipend for the project. Award is pending the availability of funds.

Requirements and Application:
Knowledge of electronic circuit analysis and basic electromagnetics is required; commitment and enthusiasm are a must. If interested, please send a brief (maximum 2 paragraphs) motivational statement to mohamed.salem@sonoma.edu and quote the project title “Wireless Power Harvester” as the subject.