

The Summer Undergraduate Research Fellowship (SURF) Symposium  
4 August 2016  
Purdue University, West Lafayette, Indiana, USA

## **A Proposal for a Wirelessly Powered, Implantable Pressure Sensor and Neural Stimulator for the Control of Urinary Incontinence**

Robert N. Tucker, Christopher J. Quinkert, and Pedro P. Irazoqui  
Department of Biomedical Engineering, Purdue University

### **ABSTRACT**

47 to 53 percent of women over the age of 20 suffer from urinary incontinence, often caused by childbirth-related damage to the pelvic nerve. This uncertainty of when bladder voiding will occur causes social anxiety and can compromise quality of life. This study explores one method to restore the ability to sense the need to urinate and prevent unwanted voiding. We propose a device to measure pressure due to bladder content as the difference between pressure in the bladder and pressure in the abdominal cavity. Integrated circuits, biocompatible packaging, and wireless radiofrequency powering allow for a fully implantable device to process the pressure data, stimulate the pelvic nerve, and stop stimulation on command. The device recognizes pressure spikes similar to those seen in the bladder prior to urinating and stimulates the pelvic nerve in acute surgeries. We hope to chronically implant the device soon to monitor long-term performance and effects of the device *in vivo*.

### **KEYWORDS**

Urinary incontinence, implantable devices, nerve stimulation, biopotential recording