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Programming External Instrumentation and Devices for Data Acquisition and Control

Vincent A. Rosa
Research Assistant & Lab Manager
Department of Bioengineering, Florida Gulf Coast University, Fort Myers, FL

Abstract. The core of the research underway within the Green Technology Research Group (GTRG) here at FGCU is two-fold: develop a system to detect toxins (Bioengineering Department) and one to destroy them (Chemistry Department). This talk focuses on the development that has taken place to achieve a system of detection, which is being tackled by the Analytical & Instrumentation (A&I) Lab. To achieve detection, the A&I Lab is developing a sensor using Titanium Dioxide (TiO_2) as the base material. TiO_2 is a well-known photocatalyst (i.e. a semiconductor that, upon UV illumination, engenders the chemical destruction of analyte molecules in contact with its surface). Because of the photocatalytic properties of TiO_2, a sensor coating made of this material has the potential to be "self-cleaning." A working prototype sensor has been developed by the A&I Lab to achieve both detection and self-cleaning. The sensor interface consists of a TiO_2-Coated Interdigitated Array (TiO_2-CIDA) Electrode. Proper testing of these coatings required experimentation to be consistent and repeatable. This means accurate timing and synchronization among the instrumentation used had to be achieved. Hence, automating experimentation was necessary. A data acquisition and control system was implemented using custom software developed with NI LabVIEW. This software is used to control and acquire data from our external devices, which include an NI PXIe system and a benchtop GPIB (General Purpose Interface Bus) power supply. The PXIe hardware is a modular system consisting of a PC-based controller (it runs the custom software), an oscilloscope, a digital multimeter (DMM), and a multiplexer (MUX).

Speaker's Bio. Vincent A. Rosa graduated *summa cum laude* from Florida Gulf Coast University (FGCU) in Spring 2009 with a Bachelor of Science degree in Computer Science. His degree concentrated in Software Engineering, and he earned a minor in Mathematics. Vincent has been employed with FGCU since Fall 2009 as a full-time research assistant in the Department of Bioengineering. He has been a part of two research projects: one funded by the Office of Naval Research (under PI Dr. Jose Barreto) involving the detection of toxins, and the other funded by the Department of Defense (under PI Dr. Sharon Isern) involving the electrochemical destruction of toxins. Although actively involved with experimentation, Vincent's main commission for these projects includes establishing instrumentation and developing software to automate testing. He has recently been accepted into a Chemical Engineering graduate program at Cornell University.