



**CYPRESS SEMICONDUCTOR CORPORATION**  
**Internal Correspondence - Confidential**

**Date:** 8/28/2012

**WW:** 1235

**To:** DRG

**Author:** GHR

**Author File#:** GHR-522

**Subject:** University Program PSoC Student Project Ideas

**Distribution:** DRG, EHK, RAIK, PKX

**Purpose:**

The purpose of this memo is to document the list of PSoC project (and component) ideas targeted at university students.

**Summary:**

DRG asked his staff to come up with project ideas for PSoC for the University students.

Below is a consolidated list from my team.

These projects are not in priority order.

We would always like a Component to encapsulate the functionality of the project where possible.

These projects need to be flushed out more if there is interest. The idea generator is included so that PKX can contact them directly to flush out the idea.

## **Details:**

### **Project 1:** Battery characterizer/analyzer/charger - MAXK

This is being already with the WSU CS engineering senior project class now.  
MAXK is supporting the professor on an as needed basis.  
Application, possible components

### **Project 2:** Stepper Motor Component and hardware – MEH

Microstepping, multi-axis, Diagonal movement  
Stepper motor control in a mixed signal microcontroller  
Should enable components

### **Project 3:** Mixed signal microcontroller based universal test instrument" - KEES

Multimeter  
    LCR  
    I/V  
OSCOPE  
Waveform generator  
Digital  
Curve Tracer  
    Diode  
    Transistor  
PC Application via USB  
Mobile Applications: Apple iOS, Android OS

### **Project 4:** PSoC DC Servo Control – MEH

Both servo and stepper  
Could leverage the quadrature decoder  
Should enable application, component

### **Project 5:** Battery powered accelerometer based bike signal - MAXK

Turn Signal  
    Accelerometer or some other sensor on the user?

Brake Signal  
    Accelerometer on bike frame  
    Application, possible component

### **Project 6:** PH meters or other chemical sensor interface. – MKEA & MEH combined around PH Sensing

Could use other related ideas where interfacing with other engineering disciplines  
Sensor applications, possible new components depending on the sensor interface  
Pool water / fish tank sensor – OAT /MEH  
Sensor application  
PH meter  
Check for other chemicals in the water  
Collect data, USB connection to PC Application, UART to Android App or iOS App

**Project 7:** Battery powered data logger, self-contained. – MEH

Temperature measurement  
Logging data to external flash

- Low power modes
- Application

**Project 8:** Intelligent power distribution units – ANTO (with GHR expansion to add WI-FI)

Power Metering over PLC demo  
Expand upon our current PSoC5 PLC implementation to demonstrate the usage at a system level.  
Show a system for power measurement and communication works together.

Minimize Power by taking advantage of sleep modes and implementing a simple communications protocol

Build a PLC to WI-FI bridge (via Redpine component) to backhaul information to a internet webserver.

ANTO#7 - iPDUs explained

**Project 9:** Color sensors – MEH

Calibrate color that enables led screen view / lcd printer output.  
Color sensor component and interface to USB, ADC, etc.

**Project 10:** Generic 3-axis accelerometer w/ compass – GIR

Current PSoC1 design. Re create on PSoC 3 & PSoC5 with a component to set up the digital sensor.

**Project 11:** Water flow meter – ANTO

Sensor application for consumption of drinking water  
Integration application

**Project 12:** USB host in PSoC – MEH

Develop a simple low speed host in PSoC UDB.

Read a USB thumb drive with FAT file system and transfer the file to SRAM or flash.  
Extra credit, bootload from the USB drive

Some work inside Cypress has been done to believe this is possible. This would need to be done as a feasibility first to make sure it is possible.

**Project 13:** Automatic temperature / light controlled shades – GIR

Measure sensors, develop a light sensor component, and drive a simple DC motor typically used for automated blinds.

**Project 14:** Battery powered shifter with intelligent shifting - KEES

Only one control for both cassettes

**Project 15:** Bad breath analyzer - ANTO

Something to save us all from Halitosis  
Sensor / gas analyzer

**Project 16:** VO2 meter – MKEA

Health and fitness application

**Project 17:** LVDT – Linear Variable Digital Transceiver – GIR

Application used to measure precision distances

**Project 18:** Soil moisture measurement – MKEA

This one could be quite complex

**Project 19:** Memory mapped I/O expanders through parallel to high speed SPI bus. -JHNW

Build a component set that takes a section of a PSoC4 or 5 and allows you to cascade other psoc1,3,4,5 chips on a high speed SPI.

In hardware we'd convert parallel reads and writes to SPI commands and decode them on the other slave chip to directly drive some number of I/Os or drive state inputs to another state machine.

We could use this to help fight our I/O problems. This would allow a simple drag and drop low speed I/o expansion.

I suggest several styles of these components focused on GPIO expansion, analog expansion ( ex: incremental A/D), and serial communication expansion.

**Project 20:** FreeRTOS and or Micrium automatic components. - JHNW

Possibly engage on curriculum development with a university and Micrium together.

**Project 21:** I like lab guides and training materials to learn PSoC components - JHNW

Small user guide 200 pages or less that are written as tutorials with small labs that teach a dozen PSoC uses

**Project 22:** I2C bridges - YMT

I2C bridges to different interfaces (SPI, UART etc). Create redundant I2C failover.

**Project 23:** Stereo Memos Microphone - GHR

Create a stereo MEMS microphone interface by developing a PDM component that interfaces to two MONO channels and creates one stereo interface.

Transport over USB Audio to the PC for extra credit.

Can build off internal work done by BJBW in 2010 as a starter

**Project 24:** Stereo Memos Microphone - GHR

Create a stereo audio component in PSoC5. Ensure resources left over are sufficient to perform other ARM cortex MCU functions after the integrated stereo ADC component is built.

Can build off internal work done by GDK/KVCP and apps team in 2011.