

Laboratory #1

Introduction to PSoC Creator

ELC 343-L2

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**Objective:**

For the first lab, students were tasked with introducing themselves to Cypress’ Programmable System on a Chip (PSoC). This goal was achieved through video tutorials, and guides provided on Cypress’ official website. By being able to utilize PSoC, the students will be able to complete the rest of the labs in ELC 343.

**Introduction:**

The development of PSoC began in the year 2000 by engineers who wanted to change the way small 8-bit MCU applications were created. Their main concern was flexibility since nothing on the market could assist in creating a custom board easily. As a result, for a short time speed and power were not very relevant to their goals. It was only after PSoC achieved the amount of flexibility in order to be useful to an engineer that they were reconsidered in the project. Today, low power and fast speed are also traits of PSoC boards. Cypress’ CapSense is also the best on the market.

As previously stated, PSoC has incredible flexibility. For analog design, it can set a custom mixed signal peripheral, see device architecture along with generated data sheet and API, be used with either firmware and software, program and debug, customize chips which cuts costs, customize what analog peripherals are used but their configurations as well, and control signal paths to circuits in order to find the best performance.

**Discussion:**

**A. What are the key features of the PSoC chip architecture?**

The key features of the PSoC chip architecture include mixed-signal arrays of both analog and digital peripherals which can be configured to the user’s needs. The main advantage of using a PSoC device is the amount of time now taken to create a custom chip. Previously what took months now takes hours. The chip and the computer application also allow for the builder to configure the amount of firmware and hardware they wish to use. For example, someone with little programming knowledge can make their chip completely reliant on hardware or the opposite case for someone who prefers software. The PSoC board was designed with both in mind and can handle either case even though most engineers go for a mixture of both software and firmware.

**B. How is PSoC Creator used in embedded systems design?**

PSoC Creator plays a large role in embedded systems design since it contains all the resources needed in order to design a fully functioning chip in the shortest amount of time. Customization is the key to its widespread use as users can tweak almost every aspect of a design until it is maximized according to their individual specifications. One such example would be signal customization. As embedded systems are becoming more complex, it is important to have this amount of control over the design process. The catalog of components and their respective datasheets are conveniently stored within the program. A system can even be tested in parts to ensure proper functioning of its entirety.

**C. What information can be obtained about a system design by opening the project in PSoC Creator?**

PSoC Creator is capable of viewing a project’s components, the datasheets for the components, schematic design, and any firmware API. This view of a system can assist in the continuation of its development as all of the necessary information is present in one source. Any important information can be configured to be present on the page with the components as well. Any technical decisions on the functionality of the system can be determined through simple tests by adjusting certain settings as well.

**D. How can a suitable PSoC based board be used to process electrical analog data?**

**Describe your scheme, and give an example.**

A PSoC based board can be used alongside PSoC Creator to process electrical analog data. For example, the blinking LED shown in the tutorial lesson. If one wants to only use hardware, then they can simply open PSoC Creator and create a “switch pin” and an “LED pin.” If an analog signal cannot be read, then one can use an analog to digital converter to get the circuit working. Then the switch can be connected to converter and the converter to the LED.

**Conclusion:**

Cypress’ PSoC, developed in 2000, has become an all-encompassing tool for any engineer who wishes to design an embedded system efficiently. The average PSoC chip can be completely hardware driven or software driven. In either case, it will react in the same way. With PSoC’s incredible flexibility, the usability of any chip design can be substantially improved as the best configuration can be found.

**References:**

Cypress Developer Community Video Library. (n.d.). Retrieved September 06, 2017, from

www.cypress.com