

# Study of Light intensity in the Environment by using PSOC1

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**Abstract**— The measurement of the meteorological parameters is very important in many areas like industry, framing, and weather forecasting to analyze a data for predict the results. Measuring light intensity is important when designing a room's lighting or preparing for a photograph. The term "intensity" is used in different ways, so take a moment to learn what units and measuring methods match the goals. This research paper describes ambient light measurement with a new advanced, low cost, portable embedded system fabricated through flexibility and ease of designing created by programmable system on chip controllers. The designed system uses the dynamic reconfiguration ability of PSoC and the provided pre-packaged libraries to connect conveniently multiple weather parameter sensors on a single chip.

**Index Terms**— LDR, LUX, PSoC- Programmable System on Chip.

## I. INTRODUCTION

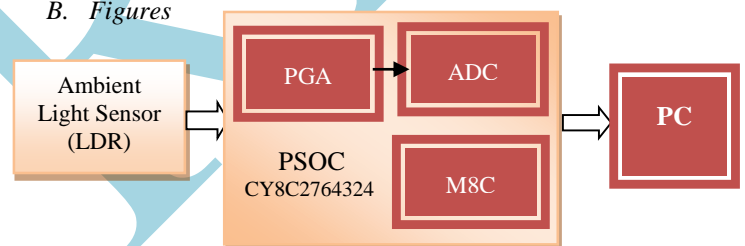
Modern embedded control systems incorporate a microcontroller as the principal component - a self contained computer-on-a-chip consisting of a central processing unit, RAM memory for data storage, a variety of input/output functions and non-volatile program memory to hold the software written to implement the specific application. (2) A PSoC integrated circuit is composed of a core, configurable analog and digital blocks, and programmable routing and interconnects. The configurable blocks in a PSoC are the biggest difference from other microcontrollers. PSoC has three separate memory spaces: paged SRAM for data, Flash memory for instructions and fixed data, and I/O Registers for controlling and accessing the configurable logic blocks and functions. The device is created using SONOS technology. PSoC mixed-signal arrays' flexible routing allows designers to route signals to and from I/O pins more freely than with many competing microcontrollers. Global buses allow for signal multiplexing and for performing logic operations. PSoC system is the user friendly system; each operated it very easily. Here system can be design of any application done in minimum time. On chip analog blocks are present which is programmable, so we reconfigure pin connections, or completely change the block function if necessary. (3)

## II. RELATED WORK

### A. Proposed System and its working:

The design and implementation of system is the model with the ability to perform data acquisition of ambient light from sensors attached. This sensor data provides analog voltage corresponding to its sensing level to the programmable gain amplifier (PGA which is configured as a buffer). This voltage is fed to the ADCINC user module. According to the sensors output it can be displayed on the PC through USB bridge circuit continuously.

### B. Figures



## III. PSOC MODULE

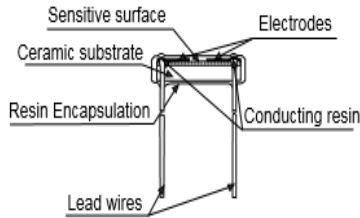
The PSoC family consists of many Mixed- Signal Array with On-Chip Controller devices. These devices are designed to replace multiple traditional MCU-based system components with a low cost single-chip programmable device. PSoC-1 module is used for this project and the chip is CY8C2764324PVXI by cypress semiconductors. This chip belongs to CY8C27X43 family. The PSoC-1 architecture is comprised of four main areas: PSoC Core, Digital System, Analog System, and System Resources. Configurable global busing allows all device resources to be combined into a complete custom system. The PSoC CY8C27x43 family can have up to five IO ports that connect to the global digital and analog interconnects, providing access to 8 digital blocks and 12 analog blocks.

## IV. ABOUT SENSOR

Typical LDR is made up of cadmium sulfide (CdS). Light dependent resistor (LDR) is a sensor whose resistance inversely depends on the amount of light falling on it. It is known by many names including the photo resistor, photoconductor, photoconductive cell, or simply the photocell.

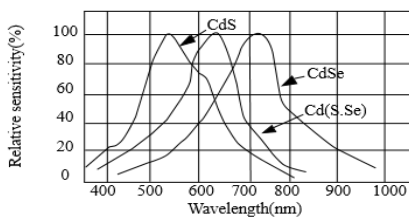
The SI unit of luminous is lux. This sensor effectively measures the amount of light falling on a given unit of area. A simple way to display a lux meter is to say that it measure the brightness of light falling on the sensor.

The figure given below shows the typical LDR



This sensor is used in the voltage divider format to find the amount of light. The voltage divider converts light in the form of voltage. This voltage is provided to another channel of analog MUX and further converted into LUX or luminous value and display on the GUI.

The figure given below shows the wavelength vs. relative sensitivity of LDR.



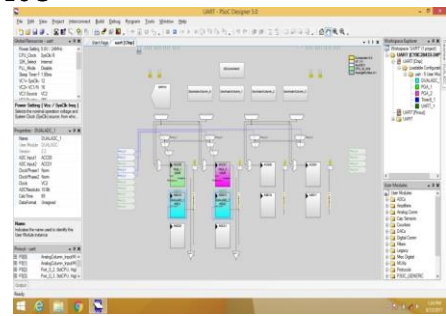
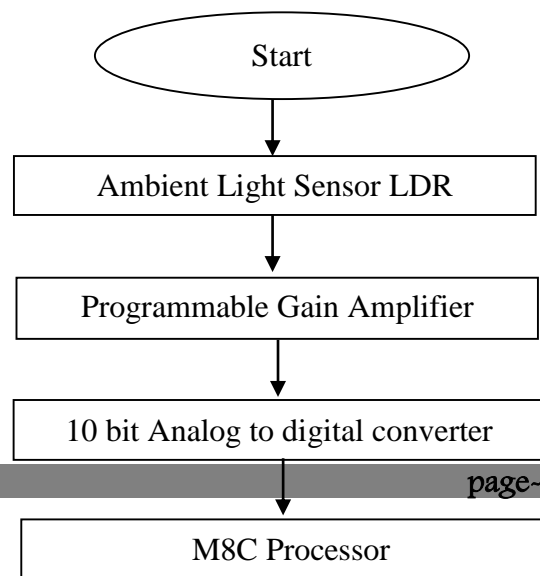
### V. SOFTWARE DESCRIPTION

**PSOC Designer** - This is the first generation software IDE to design, debug and program the PSoC-1 devices. It introduced unique features including a library of pre-characterized analog and digital peripherals in a drag-and-drop design environment which could then be customized to specific design needs by leveraging the dynamically generated API libraries of code. PSoC provides complete high performance temperature sensing and control solutions for RTDs, thermocouples, LDR, Humidity sensors and digital output of sensors. PSoC includes MUX, current and voltage sensor drive, DAC and PWM outputs for control, LCD drive, key pad or touch screen interface, power management and USB or RS-232 communication.

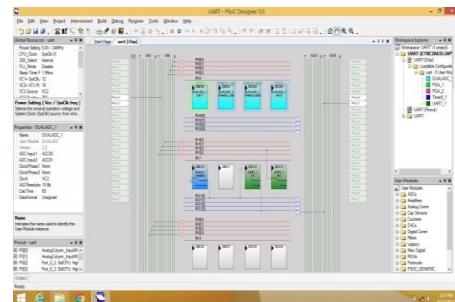
#### A. PSOC-1 Designer Design Flow –

- Determine system requirements.
- Choose user modules.
- Place user modules.
- Set global and user module parameters.
- Generate the application.
- Review generated code.

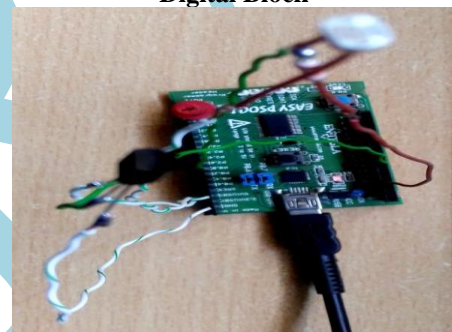
#### B. Flow Chart



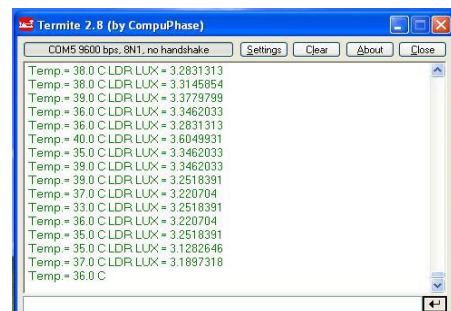
Analog Block



Digital Block



Sensor interface to PSoC



Readings on screen

reconfigure pin connections, or completely change the block functions if necessary. So that system can be upgraded in minimum time.

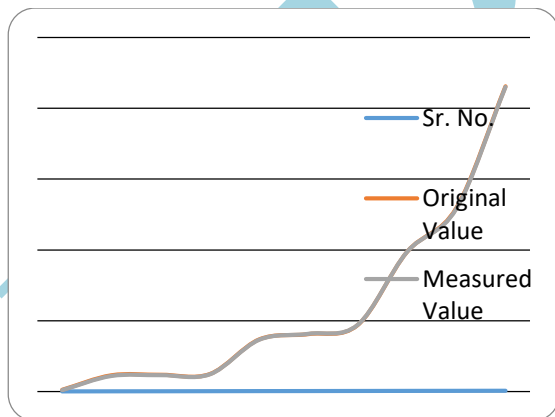
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**VI. RESULT**

Sr. No.	Original Value(LUX)	Measured Value(LUX)	Percentage Error
1	23	22.34	2.869565
2	228	222	2.631579
3	235	233	0.851064
4	246	246	0
5	735	733	0.272109
6	810	817	-0.8642
7	938	944	-0.63966
8	1970	1972	-0.10152
9	2590	2580	0.3861
10	4310	4300	0.232019

Readings of Original Values of Light Intensity in LUX Vs Measured Value in LUX



Graph of Original Values of Light Intensity in LUX Vs Measured Value in LUX

**CONCLUSION**

- A PSOC implementation of multisensory system is given in this paper.
- PSOC provides a new methodology to measure a weather parameters very easily, cost effective and easy for construction.
- The implementation takes the advantage of dynamically Configuration changing for measuring physical parameters.
- Its simplicity and effectiveness makes it suitable for fast prototyping and low cost solutions.
- In PSOC on chip analogue and digital blocks are present which are programmable. So we can

**REFERENCES**

- [1] Hardware Implementation of Dew Point Measurement, T. O. Aluko, PH. O. BoyoP, PT. P. AdebayoP, O. F. OdubajoP, University of Lagos, Nigeria
- [2] PSoC Multi sensor for Temperature, Humidity & Light Intensity, Priyanka D. Patil, R. D. Patil, Nikita N. Shinde, Vishal P. Patil.
- [3] Comparative Study of Temperature Sensors by using Programmable System on Chip (PSoC) to Monitoring Green House.
- [4] Implementation of LEACH protocol in Wireless Sensor Node Using PSoC, by Ruchika Singh, R.V.Babar, Sinhgad Institute of Technology, Lonavala, Pune, India
- [5] Design and Implementation of Weather Monitoring and Controlling System, P.Susmitha, Dept. of ECM K L UNIVERSITY Guntur (Dt), India.
- [6] PSoC1 based system for measurement for Air temperature, Ambient Light and Relative Humidity of the Environment by V. T. Kulkarni, M. N. Kumawat, S. N. Helambe, Department of Electronics, Deogiri College, Aurangabad, Maharashtra, India.
- [7] Light-Dependent Photoresistors for Sensor Applications at: <http://www.token.com.tw/>
- [8] "PSoC Mixed Signal Array Final Data Sheet", Document 38-12013 Rev. H, February 15, 2007, available at: <http://www.cypress.com/psoc>
- [9] Comparative Study of Temperature Sensors by using Programmable System on Chip (PSoC) to Monitoring Green House, by V. T. Kulkarni, M. N. Kumawat, S. N. Helambe, Department of Electronics, Deogiri College, Aurangabad, Maharashtra, India.