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# SD Card with Interface Using PSOC

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**ABSTRACT:**
Keeping records of huge and important data is one of the most important issues considered in many applications like data logging systems in industrial applications. Maintaining the database on the server is one of the option but it is quite complex and implementation cost is high. To overcome this problem, we are going to interface a SD card with the PSOC microcontroller which will not only reduce the implementation cost but also will be easy. So in this project we are going to interface a SD card with the PSOC microcontroller that can be used for different applications. Finally we can remove the SD Card and retrieve all the logged data as per our wish. The hardware used in this project is PSOC microcontroller and a SD card is using the PSOC CY8C29466-24PXI microcontroller family. The PSOC designer software will be used for implementing the software modules.

## I. INTRODUCTION:

Secure Digital (SD) is a non-volatile memory card format developed by Panasonic, SanDisk, and Toshiba for use in portable devices. It is widely used in digital cameras, digital camcorders, handheld computers, net book computers, PDAs, media players, mobile phones, GPS receivers, and video games. Standard SD cards have an official maximum capacity of 2 GB, though technically they can store up to 4 GB. SDHC (High-capacity) cards have a maximum capacity of 32 GB. SDXC (extended Capacity), allows for up to 2 TB cards. A Secure Digital (SD) card is a tiny memory card used to make storage portable among various devices, such as car navigation systems, cellular phones, eBooks, PDAs, smart phones, digital cameras, music players, camcorders, and personal computers. An SD card features a high data transfer rate and low battery consumption, both primary considerations for portable devices.

It uses flash memory to provide nonvolatile storage, which means that a power source is not required to retain stored data[1]. Design and implementation An SD card, mini SD card, and micro SD card from top to bottom.SD cards are based on the older Multimedia Card (MMC) format, but have a number of differences: The SD card is asymmetrically shaped in order not to be inserted upside down, while an MMC would go in most of the way but not make contact if inverted. Most SD cards are physically thicker than MMCs. SD cards generally measure 32 × 24 × 2.1 mm, but as with MMCs can be as thin as 1.4 mm if they lack a write-protect switch; such cards, called Thin SD, are described in the SD specification, but they are non-existent or rare in the market as most devices requiring a thinner card use the smaller (and thinner) versions of SD: mini SD or micro SD.

The card's electrical contacts are recessed beneath the surface of the card, protecting them from contact with a user's fingers.SD cards typically have transfer rates in the range of 80–160 Mbit/s , but this number is subject to change, due to recent improvements to the MMC standard[2].Optional write-protect tab When looking at the card from the top (see pictures) there is one required notch on the right side (the side with the diagonal notched corner).On the left side may be a write-protection notch. If this is present, the card cannot be written. If the notch is covered by a sliding write protection tab, or absent, then the card is writeable. Because the notch is detected only by the reader, the protection can be overridden if desired (and if supported by the reader).

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Not all devices support write protection, which is an optional feature of the SD standard. Some SD cards have no write-protection notch and it is absent completely in the Micro SD and Mini SD formats. Some music and film media companies (e.g., Disney) have released limited catalogs of records and/or videos on SD. These usually contain DRM-encoded Windows Media files, making use of the SD format's DRM capabilities such media are usually permanently marked read-only by adding the notch with no tabs. Like other flash card technologies, most SD cards ship preformatted with the FAT or FAT 32 file system on top of an MBR partition scheme. The ubiquity of this file system allows the card to be accessed on virtually any host device with an SD reader. Also, standard FAT maintenance utilities (e.g., SCANDISK) can be used to repair or retrieve corrupted data.

However, because the card appears as a removable hard drive to the host system, the card can be reformatted to any file system supported by the operating system [8]. Conversely, an SD card can contain an embedded operating system (such as a Live USB) to recover a corrupted host computer by natively booting from the flash media reader.SD cards with 4 GB and smaller capacities can be used with many systems by being formatted with FAT16 (4 GB only possible by using 64 kb clusters, and not widely supported) or FAT32 file system (common for file systems 4 GB and larger). Cards 4 GB and larger can only be formatted with a file system that can handle these larger storage sizes, Flash memory technology has several advantages over hard disc drives, such as: portability, low power consumption, shock resistance, convenience. You can also store: photos, Video, other files, on the versatile SD card.

### PSOC Micro Controller:

When developing more complex projects, there is often a need for additional peripheral units, such as operational and instrument amplifiers, filters, timers, digital logic circuits, AD and DA convertors, etc.

As a general rule, implementation of the extra peripherals brings in additional difficulties: new components take space, require additional attention during production of a printed circuit board, and increase power consumption. All of these factors can significantly affect the price and development cycle of the project. The introduction of PSOC microcontrollers has made many engineers' dream come true of having all their project needs covered in one chip. PSOC architecture: Programmable System on Chip PSOC (Programmable System on Chip) represents a whole new concept in microcontroller development [7]. In addition to all the standard elements of 8-bit microcontrollers, PSOC chips feature digital and analog programmable blocks, which themselves allow implementation of large number of peripherals.

Digital blocks consist of smaller programmable blocks that can be configured to allow different development options. Analog blocks are used for development of analog elements, such as analog filters, comparators, instrumentation (non–) inverting amplifiers, as well as AD and DA convertors. There are number of different PSOC families you can base our project upon, depending on the project requirements[4]. Basic difference between PSOC families is the number of available programmable blocks and the number of input/output pins. Number of components that can be devised is primarily a function of the available programmable blocks.

## II.LITERATURE SURVEY:

A microcontroller is a single chip, self-contained computer which incorporates all the basic components of a personal computer on a much smaller scale. Microcontrollers are often referred to as single chip devices or single chip computers. The main consequence of the microcontroller's small size is that its resources are far more limited than those of a desktop personal computer. In functional terms, a microcontroller is a programmable single chip which controls a process or system.

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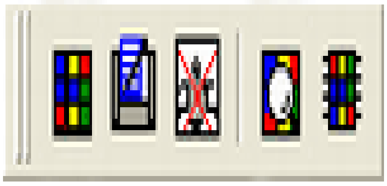
Microcontrollers are typically used as embedded controllers where they control part of a larger system such as an appliance, automobile, scientific instrument or a computer peripheral. Microcontrollers are designed to be low cost solutions; therefore using them can drastically reduce part and design microcontroller is not the same as a microprocessor [6]. A microprocessor is a single chip CPU used within other computer systems. A microcontroller is itself a single chip computer system. Personal computers are used as development platforms for microcontroller projects. Development computers, usually personal or workstation computers, use a microprocessor as their principle computing engine. Microprocessors depend upon a variety of subsidiary chips and devices to provide the resources not available on the microprocessor.

Additional chips required with microprocessor support memory storage, input/output control and specialized processing[5]. A development platform is required to run embedded system development software such as assemblers, compilers, editors and simulators which require the processing power and memory capabilities of a desktop personal computer or workstation. The target platform is the platform on which the finished program will be run. For example, consider a developer who is creating a program for a microcontroller. The developer writes, edits, and tests the program on a Pentium personal computer: the development platform. The developer will use software which runs on a Pentium but whose target device. When the program is ready it is programmed in the target platform.

## III.EXPERIMENTAL DESIGN:

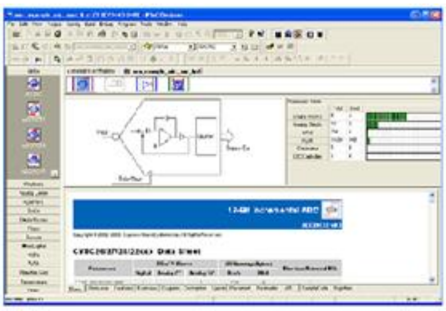
PSOC Designer is program package that leads user through all stages of developing project. Version discussed here will be 4.2, but this book will still remain competent in case of newer versions, because differences are shown only in addition of new programmable components and some minor improvements.

The most important for user is to get familiar with two main parts of PSOC Designer: Device Editor, Application Editor [3].



Programmable Component Selection: Most important part of the programmable component selection window is placed on the left side. Components sorted in several groups, like AD converters, amplifiers, analog communications, counters, etc. After group selection, necessary component for project should be selected with double-click, or right-click on select. In the case of successful selection, appropriate graphical symbol would be shown in selected components slot. Returns a pointer to a filename from the directory using a passed index . For instance, an index of five returns the fifth valid filename in the directory. Call SD _ GetFileCount first to make certain that you do not index beyond the valid choices.The pointer returned by SDCard _ GetFilename() is a pointer to a string in scratchpad memory Read and save this filename string immediately if it is needed later on in the program. Otherwise, Buffer may get overwritten and the filename deleted.

C Prototype: uchar *SDCard_GetFilename(uint Entry)



### Device editor:

Interconnection View: Previously selected components are still unusable, until they are placed in digital or analog programmable blocks, and until appropriate parameters are set.

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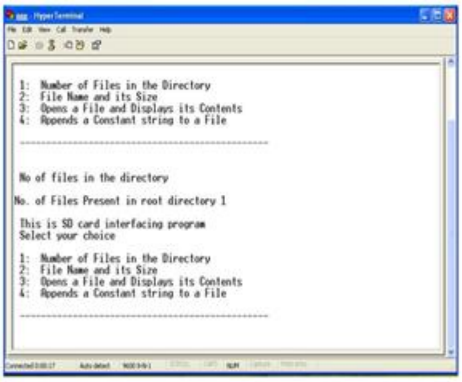
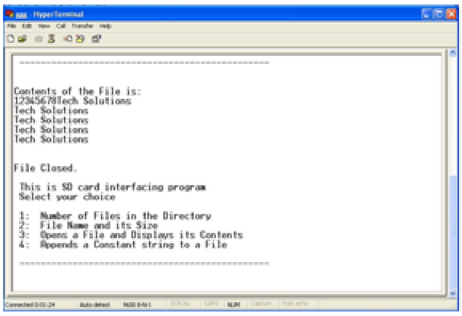
This important part of work can be done in Interconnection View window. Central part of this window is graphical representation of programmable blocks and connection lines. Digital components, which are stored inside of programmable blocks, aren't connected directly to input or output pins. It is done in a way shown on following picture, which depicts group of four digital programmable blocks. As it could be seen, pin connection is established using global connection lines, multiplexer and lines of programmable blocks. PSOC microcontrollers can have one, two or four digital programmable block groups like this one depending on their family. This enables custom hardware adjustment of the system for specific uses. The process of setting and connecting using PSOC Designer is very simple to understand, but at first is necessary to understand the way those components function. Most components, like counters, is ground voltage for analog components[4]. Voltage values higher than AGND are considered as positive, while less is negative this type of convertor gives voltage supply value higher than battery voltage[9].

## IV.SIMULATION RESULTS:




## V.CONCLUSION:

This project "SD card interfacing with PSOC microcontroller for bulk data storage" has been successfully implemented and tested. It has been developed by integrating features of all are components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully designed.

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