Project Requirements

The project for this term, in a nutshell, is to design, build, and test a pocket-sized portable digital camera. Although some design details are left open, each group’s system must use certain required components and construction methods described in §1 and meet certain minimum requirements described in §2. Bonus points can be earned by implementing optional functionality described in §3.

1 Components and Construction

Reasonable quantities of all specifically required parts will be provided to each group, and the cost of one prototype PC board run will be paid.

Processor The primary source of “processing power” shall be a Microchip PIC18LF4525 microcontroller. No additional microcontroller-like device or other source of processing power may be used.

Lens/Image Sensor The system shall use Sunex DSL 851A lens focused on a Kodak KAC-9628 or KAC-9647 CMOS image sensor to capture images.

Image Data Storage The system shall use a standard, removable MultiMediaCard (MMC) flash memory card for data storage, with image files stored in a DOS FAT16 filesystem.

Display The system shall use a Seiko RNH942209R1A cellphone LCD display module as a viewfinder and to display any information about system status and/or image files stored on the MMC.

Power The system shall be powered solely by an Apple iPod Li+ battery pack (either 3g or mini). The system shall support battery recharge using a wall adapter and the Maxim MAX1555 Li+ battery charger IC.

Construction The system shall be housed securely and permanently in one of the following makes/models of enclosure:

- Pactec Model PP
- Teko Soap (P/N 10007)
- Teko Soap (P/N 10014)
- Teko Soap B (P/N 10011)
- Teko Soap B (P/N 10015)
- Teko Soap B (P/N 10016)
- Teko Squid 1 (P/N SQ124)
- Serpac Model C-10
- Serpac Model C-12
- Serpac Model H-45

Use of any other enclosure must be approved in advance by the instructor.
All construction methods shall be “standard,” in the sense that they could be specified to and carried out by a manufacturer on a production lot of 1000 or more systems.

- The main electronics assembly shall be mounted on a printed-circuit board—no prototyping boards or point-to-point wire connections are allowed.
- PC boards and other subassemblies shall be mounted using accepted secure methods such as screwing to bosses, snap-fitting into an enclosure cut-out, etc.—no hot-glue, duct tape, or other jury-rigging is allowed.
- All electrical connections between PC boards and/or other subassemblies shall be via standard wire-to-board or board-to-board connectors.
- The entire exterior of the enclosure shall have a “finished” appearance.
- It shall be possible to open the enclosure, inspect its interior or replace the battery, and reclose it easily without damaging the system.

2 Minimum Functionality

If no MMC card is inserted, the system shall indicate this on the LCD display. The rest of the functionality assumes that an MMC card formatted with a FAT16 filesystem is inserted continuously:

The system shall be able to display dynamically on the LCD data captured by the CMOS image sensor (at an update rate of at least 4 frames per second). When a “shutter” button is pressed, the system shall capture a frame of data from the sensor and store it in a file on the MMC in a format that can be converted by the current version of the Netpbm package (see http://netpbm.sourceforge.net/) to a JPEG image.

3 Optional Functionality

To earn bonus points, optional functionality may be implemented. At the time of the Preliminary Design Review, each group may propose functionality that they will attempt to implement. The number of bonus points to be awarded if the implementation is successful will be negotiated with the instructor at this time.