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The Vision

The main idea behind this project is to develop an internet-enabled camera. A microcontroller with built in Ethernet support will interface with a base computer and a CMOS digital camera module. Commands will be passed from a PC to the microcontroller which will then issue them to the camera. Eventually, this platform can be built on to do a wide host of applications. The purpose of this project is to design this platform.

Functional Requirements

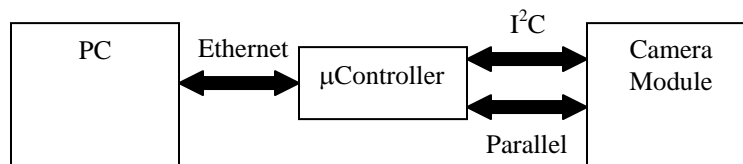
- Must be able to interact with PC over Ethernet interface.
- Must support TCP/IP
- Be able to grab a single frame from camera module.
- PC must be able to modify camera settings.
- Micro controller will do basic formatting of image data before sending back to PC

Non-functional Requirements

- Cost: cost will no exceed \$200 for all parts.
- Performance: Microcontroller must have a high enough performance to be able to support TCP/IP.

Hardware Architecture

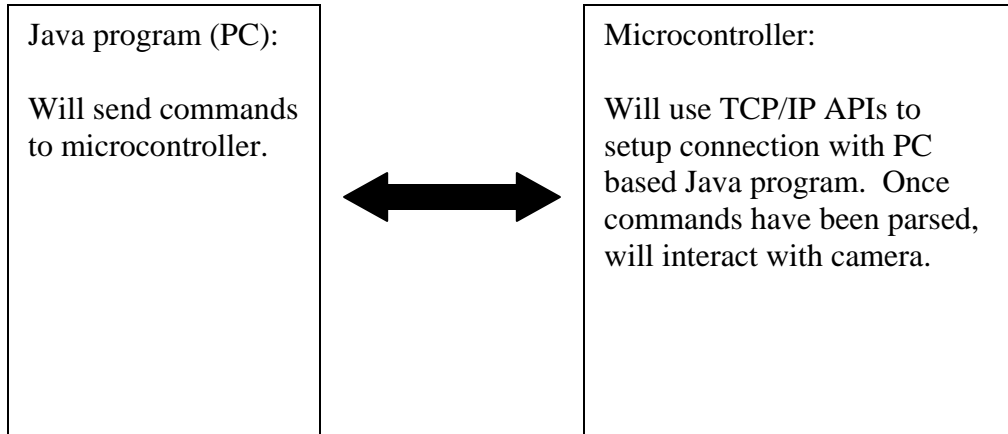
The hardware architecture for the project is relatively simple. Below is a simple diagram.



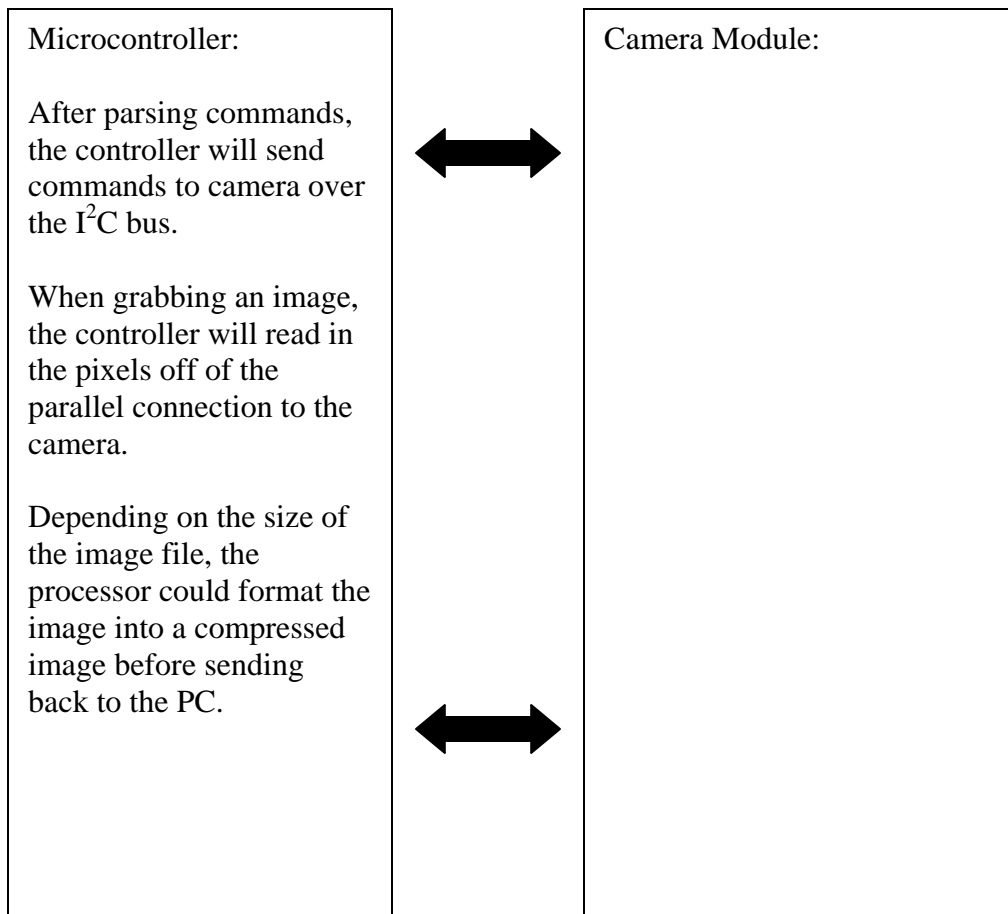
Software Architecture

The software design of the project will be split into two phases: Ethernet interface and Camera interface.

Ethernet Connectivity



Camera Interface



Parts

For the initial platform, an Ethernet-enabled microcontroller and a CMOS camera module are needed.

The two following camera modules could be used:

- C3188A Color CMOS Camera
(<http://shopping.netsuite.com/s.nl/c.317485/sc.8/category.45/it.A/id.42/.f>)
- C3088A Black and White CMOS Camera
(<http://shopping.netsuite.com/s.nl/c.317485/sc.8/category.45/it.A/id.67/.f>)

The color module would be preferable, but availability might be an issue. If this is the case, the C3088A could be used.

As for a microcontroller, the Zilog EZ80 Acclaim! has been chosen. It has a higher performance than many microcontrollers (it runs at 50MHz) and it has built in Ethernet support and comes with a TCP/IP API.

The following development board for the Acclaim was purchased:

eZ80F910100KIT (Development Kit)
[<http://www.zilog.com/products/partdetails.asp?id=eZ80F910100KIT>].

Interfacing

As was detailed in the hardware architecture diagram, the microcontroller will interface with the base PC over a standard Ethernet connection. The controller will be assigned its own IP address and will be addressed as such. The camera interface will consist of the I²C bus lines and the 16 digital output lines from the camera. It may turn out that only 8 of these are needed.

Sources

Microcontroller – purchased from Digikey for \$100.

Camera – possible sources:

- www.electronics123.com
- <http://store.qkits.com/>
- <http://www.quasarelectronics.com/> (British)