



uClinux:

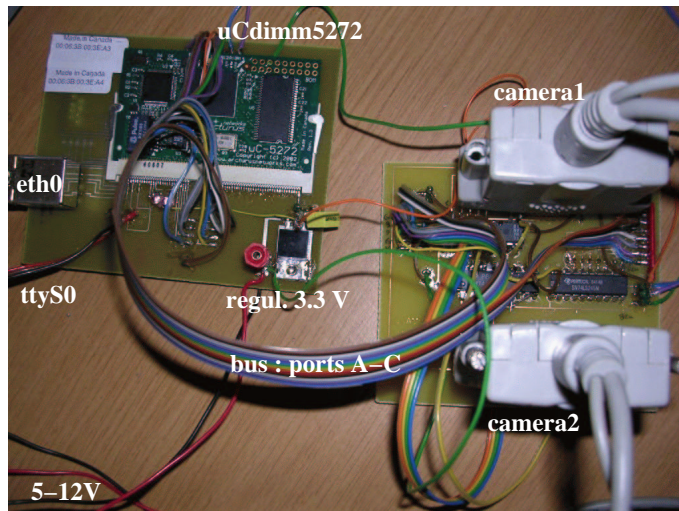
- port of linux for processors without Memory Management Unit,
- minimal memory requirement,
- full image (kernel+applications+libraries<2 MB)

Coldfire CPU (Motorola):

- commercially available: Arcturus Networks uCdim5272, SSV DNP5280
- low power consumption,
- powerful (66 MHz) ...
- while providing useful hardware peripherals:
 - SPI, I²C (Coldfire 5282 only), RS232, ethernet busses
 - analog to digital conversion for the Coldfire 5282

Applications:

- image acquisition and processing
- acquire analog values (environment: temperature, pressure ...)
- airborne applications (balloon, radio controlled plane)



High resolution image obtained using a remote controlled (RS232) digital camera



Low resolution images: B/W Connectix Quickcam connected to the 5272 GPIO ports

Development environment:

- linux provides scheduler, memory management, libraries (jpeg, TCP/IP, zlib, pthreads ...)
- cross-compilation (m68-elf toolchain) on PC
- execute program from NFS or flash in non-volatile memory (4-8 MB)
- mix of system programming (use linux modules) and microcontroller direct hardware access
- hardware access from **user space** on the 5272, requires **kernel module** for the 5282

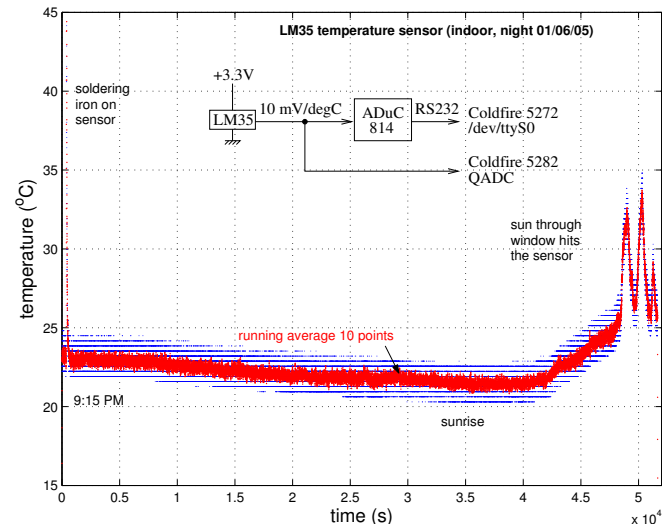
Example for accessing a parallel port (GPIO):

```
#include <asm-m68knommu/m5272sim.h> // defines PADDR
*((volatile unsigned short *) (MCF_MBAR+MCFSIM_PCDDR))=0xe0ff; // PA, PB
*((volatile unsigned char *) (MCF_MBAR+MCFSIM_PCDAT+1))|=0x04; // PA
val=*((volatile unsigned char *) (MCF_MBAR+MCFSIM_PCDAT )); // PB
```

Results:

- stereoscopic imaging with motorized black and white webcams
- direction connexion of a color CMOS camera to the Coldfire data bus (higher framerate)
- recording of analog values via microcontroller on RS232 port for Coldfire 5272, or direct QADC programming on Coldfire 5282

Eight available analog inputs for environmental monitoring, here for example for temperature monitoring.



Left: temperature reading over night as monitored by the QADC of the 5282 connected to an LM35 sensor. Right: color image captured from an Omnivision OV6620 connected to the data bus, transmitted to ground by NFS, using an DLink-810+ ethernet-wifi converter.