

## A movie poster for 'The Beagles'. The title 'THE BEAGLES' is at the top in a stylized, yellow, serif font. Below the title, a street scene is depicted. In the foreground, four beagles are crossing a zebra crossing. The street is paved with cobblestones and has a dashed white line down the center. In the background, a white Volkswagen Beetle is driving towards the viewer. The street is lined with trees and buildings, and the sky is blue.

- [illegible]

## The BeagleBoard is...

- A Workstation
- A Microcontroller
- An Audio/Video Processor
- An Embedded Linux System
- A Remote Sensor

## In Linux, everything is a file

Learning about Linux through SYSFS

Thanks to Bill Gatliff

## The file interface abstraction

- What can we do with files?
  - open, read, write, close, delete
- What is an 'ioctl'?
  - Gets you to the hardware!
- What is a virtual file system?
  - Looks like a file, but executes code in the driver
  - Not really storing anything to media
  - A bit like a "ram disk"

## What is SYSFS?

- Virtual file system that exposes drivers to userspace
- `/sys/devices` ← driver hierarchy
- `/sys/bus` ← links to bus owners
- `/sys/class` ← common interfaces
- `/sys/block` ← block interface
- Let's go thru some examples...

## What is SYSFS?

- Virtual file system that exposes drivers to userspace
  - `beagle$ cd /sys/class`
  - `beagle$ ls`
- |           |             |          |              |              |             |
|-----------|-------------|----------|--------------|--------------|-------------|
| backlight | firmware    | lcd      | net          | scsi_device  | tty         |
| bdi       | gpio        | leds     | power_supply | scsi_disk    | udc         |
| block     | graphics    | mbox     | pwm          | scsi_generic | usb_device  |
| bluetooth | hwmon       | mdio_bus | regulator    | scsi_host    | vc          |
| bsg       | i2c-adapter | mem      | rftkill      | sound        | video4linux |
| devfreq   | i2c-dev     | misc     | rtc          | spi_master   | vtconsole   |
| display   | input       | mmc_host | scsi_changer | spidev       |             |
- Let's go through some examples...

## Hands On: Test USR2 LED

```
beagle$ cd /sys/class/leds
beagle$ ls
beagle$ cd "beaglebone::usr2"
beagle$ ls
brightness device max_brightness
power subsystem trigger uevent
beagle$ cat brightness
0
beagle$ echo 1 > brightness
beagle$ cat brightness
1
```



USR2 LED will Turn on and off.

## Hands On: Test USR0 LED

```
beagle$ cd /sys/class/leds
beagle$ ls
beagle$ cd "beaglebone::usr0"
beagle$ ls
brightness device max_brightness
power subsystem trigger uevent
beagle$ cat trigger
none mmc0 timer [heartbeat]
backlight gpio default-on
beagle$ echo none > trigger
beagle$ echo timer > trigger
beagle$ ls
beagle$ echo timer > trigger
brightness delay_on max_brightness
subsystem uevent
delay_off device power trigger
```



USR0 LED will Turn on and off.

13

## Reading a Switch

```
$ cd /sys/class/gpio
$ ls
$ echo 7 > export
$ ls
$ cd gpio7
$ ls
$ echo in > direction
$ cat value
$ ./readgpio.sh 7
```

[press](#) User Button

[press](#) **<ctrl> C** to stop



15

## Reading USB Ports

•Read what USB devices are connected to the processor

```
$ cd /sys/bus/usb/devices
$ ls
$ cat usb1/speed
$ cat usb?/manufacturer
$ lsusb
```

19