Physical User Interface Protoyping Toolkits

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With
Shane Weddle, Mad Catz
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http://hci.rwth-aachen.de/toolkits
iStuff (CHI 2003)

Application

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¡¡¡button1 pressed!!
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Event Heap

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7–12V in

USB

USB power

...or...

3.3 & 5 V

6 PWM ‘analog’ out  14 digital I/O (40mA)

ATmega 168
@ 16MHz

ICSP

ATmega 168A-8-PU

3.3 & 5 V

6 analog in

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Arduino Bluetooth

Arduino Stamp & USB board

Arduino ZigBee
int ledPin = 13;

void setup() {
    pinMode(ledPin, OUTPUT);
}

void loop() {
    digitalWrite(ledPin, HIGH);
    delay(1000);
    digitalWrite(ledPin, LOW);
    delay(1000);
}
Arduino Language

• C with some C++ constructs
• Similar to Processing (for visual programming)
• Links against AVR-libc (open-source gcc library for Atmel µControllers)
• All programs have `setup()` and `loop()`
• Of note: digital & analog I/O, pulse and shift output, timers, interrupts, serial communication, port manipulation, flash memory access
Arduino Example: Wearable Snowboard Assistant

- Sensor interface (Arduino BT)
- Digital compass
- Mobile phone

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1. Buy $35 Arduino USB “Diecimila” board, download and install free development IDE & USB driver (all via www.arduino.cc)


3. There is no step 3
If it doesn’t work

• Select “Arduino Diecimila” in the “Tools:Board” menu

• Windows users, use “run.bat” to launch IDE instead of executable

• Get latest USB driver from http://www.ftdichip.com/Drivers/VCP.htm
Summary

• The case for physical prototyping toolkits

• Dumb interfaces, μControllers, middleware, IDEs

• Arduino: modern, open-source, cross-platform, cheap

• http://hci.rwth-aachen.de/toolkits