Nunchuck and Arduino Leonardo

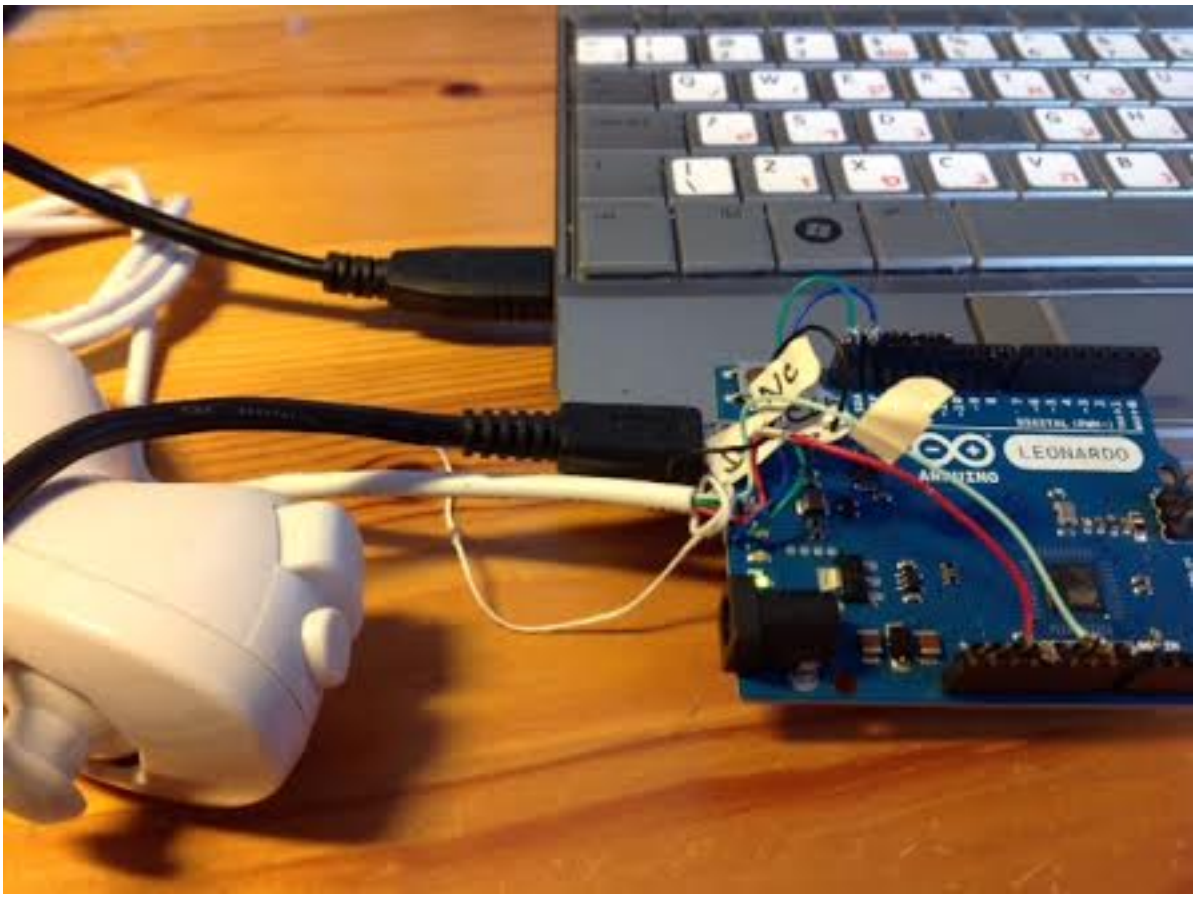

Figure 1: Overview

Motivation

This is part of a more general project based on challenging the concept of keyboard + mouse

The basic idea is “I only have 2 hands. I need both hands for my keyboard. Why the hell was the mouse ever invented ?”

There are 2 solutions to the problem:

1- Do not use the mouse, dedicate both hands to the keyboard

2- Find a sngle hand keyboard, and uses you free hand for the mouse

I tried mulitples “single hand keyboard” approaches. (learn to use the full keyboard with a single hand, Frog layout, mirrored layout. I can use all of them, but speed is always low

The idea of using the same keyboard approach for mobile and desktop raised my curiosity, but I did not have high expectations in terms of performance

8Pen Presentation

Available only on android. Will never be available on iOS devices

Usage : Copied from http://www.8pen.com/concept

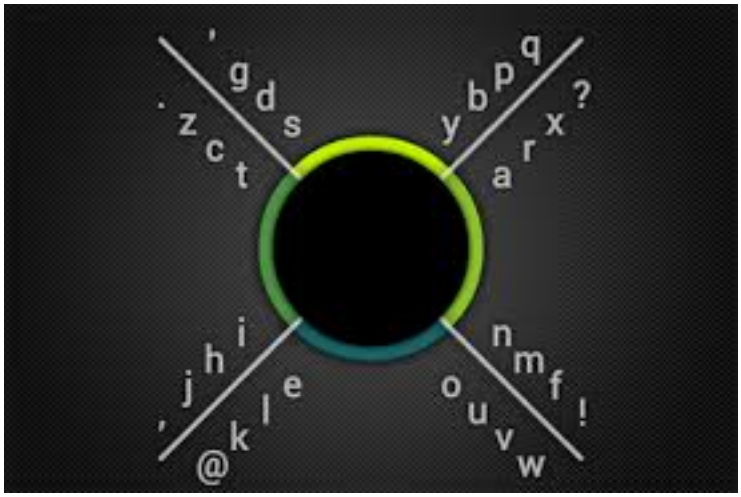

Figure 2: 8Pen usage

```
To enter a letter, start by placing the finger/pointer in the central region
Without lifting, move out in the sector that contains the letter
Turn clockwise or anti-clockwise, according to the side on which the letter lies
Cross 1 to 4 branches, according to the order of the letter on the boundary, and return to the center to place i
```

Implementation

Use the joystick on the nunchuck (not the accelerometers)

Use the buttons for special characters

Limitations

Multi keys ExControl – C

Strict multi key is not possible

Could be done by Control followed by “C”, but very unconfortable

BUT it is possible to create a special “Control-C” key, or any frequently used key sequence

Mouse Emulation

Was not part of the initial objective, but seemed a natural extension.

When C button is pressed, the joystick simply moves the mouse cursor.

Pressing C and Z buttons causes a left mouse click

No right mouse click at the moment

Wiring

I had very limited equipment at hand at the time of execution. Cut the wires of the nunchuck, and solder on header rows, to be inserted into arduino

Use the HID USB emulation to connect to any computer. Nothing to do on the computer.

My nunchuck is white, and has 5 wires

Do not blindly trust the wiring instrucations below, your device may be different.

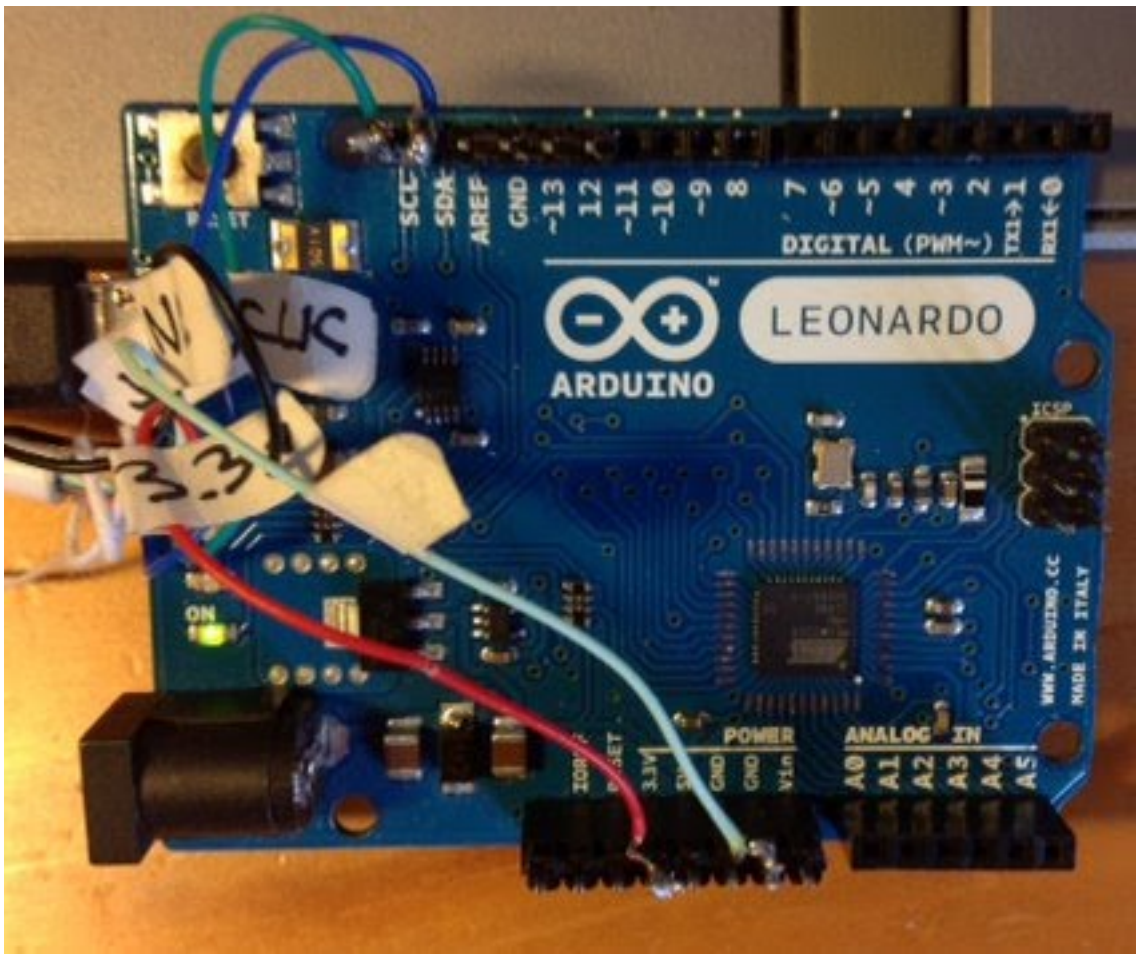

Figure 3: Wiring

There are multple articles on the web helping for the connection of a nunchuck to an arduino

Colour Connect to Signal

Black Not Connected

Blue Arduino SDA Data

Green Arduino SCL Clock

White / ligh Green Arduino GND GND

Red Arduino +3.3V 3.3 V

Connect the USB mini arduino connector to a USB plug on the computer. The computer provides 5V to the arduino, which in turns provides 3.3 V to the nunchuck. This has worked on a wide range of computers, running linux and windows. No current limitation problem noticed

Code Structure

Using ino python framework

I2C for communication with nunchuck

Setup function

Initialize Wire library for i2c connections

Keyboard.init

Mouse.init

Loop Function

if cButton is pressed, uses the mouse mode

Simpy move the mouse in the appropriate direction

Read x an y coordinates (0 - 255)

Convert to center based coordinates (-128 - +127)

Convert to polar coordinates (Radius, angle)

Optimisation

In fact, does not calculate the angle itself, but only the cosinus of the angle.

Similarly, does not calculate the radius, but radius * radius

Radius is used to determine if within the central area

Cosine of Angle Plus X polararity determines the segment

Logic is simple.

Remains in central area: Do nothing

Outside of central area: Keep record of quadrants visited

Back in central area: Process sequence, and send character

ParseSequence Function

Parses the sequence and send the corresponding key to USB

if zbutton is pressed, uses the keypad mode. Otherwise, uses the standard keyboard mode

Extensions of the 8Pen standard

New line, space and back space on single movement (simple down, right or left)

Learning Required

Learning is not trivial, but reasonable. 1 to 2 weeks of 20 minutes daily practice should get you started.

I recommend purchasing 8Pen for android for 99 cents for learning

Can it be useful ?

Whenever full control in one hand is required

Handicaped, professional activity, presentation

Keyboard can easily be curstomised for a given subset of keys of professional usage (data collection, control)

Comments :

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Future developments

pdf conversion

```
pandoc -s -o 8pen_Nunchuck_Leonardo.pdf  -V geometry:"top=1cm, bottom=1cm, left=1cm, right=1cm" README.md
```

github

https://github.com/rdubois440/8Pen_Nunchuck_Leonardo