ECE 471 Final Project (Sample) Raspberry Pi Falling Block Game

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http://www.deater.net/weave/vmwprod/hardware/pitris/

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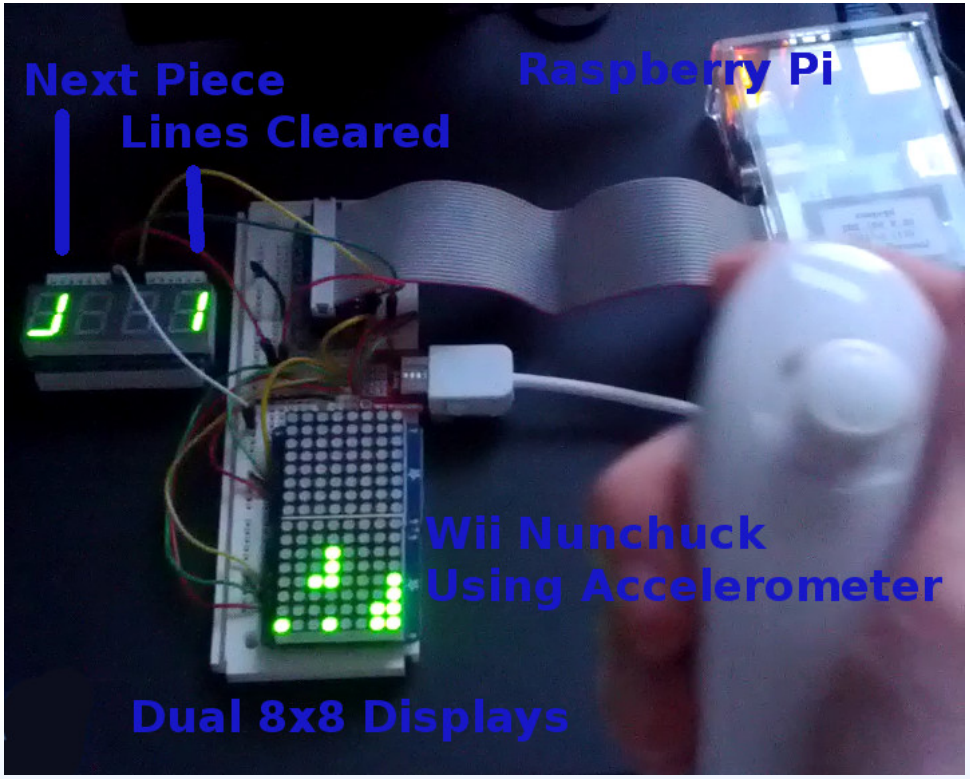
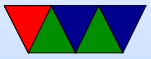
Overview

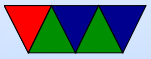
- Falling block game, similar to Tetris





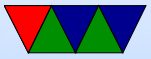
Hardware Setup

- Raspberry Pi B
  600MHz ARM1176, 512MB RAM
- Running Raspbian, `/etc/rc.local` automatically boots into game
  Using an Operating System made life much easier.
- Game coded in C. Because I like C, and it is much easier than assembly.



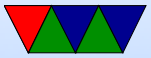
Input

- Wii Nunchuck – accelerometer, joystick, two buttons
- Uses i2c bus, address 0x52
- Send handshake to initialize.
  Use longer one (0xf0/0x55/0xfb/0x00) not the simpler one you might find (0x40/0x00). This works on generic nunchucks and possibly also disables encryption.
- To get values, send 0x00, usleep a certain amount, and read 6 bytes. This includes joy-x, joy-x, accelerometer x/y/z and c and z button data.



Output

- Three ht16k33 LED backpacks from Adafruit: two 8x8 monochrome, one 4x7 segment
- Soldered terminals to give unique i2c addresses: 0x70, 0x71, 0x72
- Two 8x8 displays = playfield
- 4x7 display = lines cleared, next piece

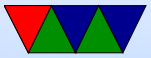


Hardware Concerns

- Power usage – plugs into wall, so no battery related power concerns

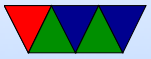
  pi is low power (less than 3W) so overall power not a concern

  To save power could disable the display when idle which might save some power
- Code density – not an issue, as the pi has relatively large amounts of RAM and disk.



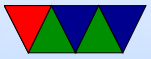
Software Concerns

- Real Time – the game is soft realtime.
  Definitely not hard real time.
  Could argue firm (for framerate) but not coded that way.
- Security – not network accessible, nor keyboard input
  Even if an attacker could break in, short of erasing the game there are not many risks.



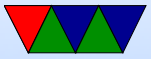
Challenges

- The accelerometer controls are a bit difficult
- The 8x8 display is rotated 90 degrees as well as one of the rows wrapped around. This was found by trial and error and had to be worked around.



Future Work

- Better gameplay (too easy to drop next piece)
- Player-vs-player mode?
- Sound effects?



Demo/Questions

- See also a video:
  `https://www.youtube.com/watch?v=LOmpkivQIkM`