Mini Color Sudoku
ECE 153B Final Project Proposal
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Overview

A single player uses a Wii nunchuck to solve a randomly generated 8x8 pseudo-sudoku puzzle (not necessarily with a unique solution), with 8 distinct colors instead of numbers. The joystick of the nunchuck moves a white blinking cursor around the board. Pressing the 'Z' and 'C' buttons / triggers of the nunchuck cycles forward and backward through colors. The "set" blocks, or puzzle hints, are brighter to indicate that they cannot be changed. There will be some visual indication of victory. If we have time, we will implement difficulty selection by displaying the letter E (easy), N (normal), or H (hard) on the LED screen which can be cycled by a button on the LPC4088 board.

Peripherals

1. Generic 8x8 RGB LED Matrix
2. Wii Nunchuk (buttons and joystick, accelerometer not used)
3. (if time permits) LPC4088 button for difficulty selection

Software Design

We will research Sudoku puzzle generating algorithms in order to create a completed solution; some blocks, the non-hints, will be chosen to be invisible to the player. If we are unable to program a decent algorithm, then we can just find some pre-made puzzles online and upload those (worst case). We will prioritize finishing interfacing the peripherals to our LPC over the sudoku algorithm.

Here is the general algorithm of what we think would work for right now:
1. Starting at the beginning, fill the current block with a number
2. Check if the number is in the row, column or box (2x4 instead of 3x3)
   a. If it is in there, then pick another number
   b. Also, if the solution is not valid, we need to backtrack and redo wrong parts
3. Repeat for the rest of the cells

After this is generated, we will delete the number from enough cells so that the puzzle can be completed by a player. The numbers will be assigned to colors, then the hints will be uploaded to the LED matrix. If the whole matrix is lit, then we will check to see if the solution is right. If it is incorrect, the player continues, and the matrix is re-checked after every color change.

The Wii Nunchuck interacts using I^2C, with values of
1. Joystick X
2. Joystick Y
3. Z button
4. C button

The buttons would need to be debounced, and a timer would move the cursor in one direction at a set rate if a joystick direction is maintained. The cursor "wraps around" the LED screen, e.g. when it moves left at the left edge, it reappears on the right edge.

Goals

- The primary goals are to interface our peripherals to the LPC4088.
- The secondary goal is to create a random 8 x 8 Sudoku generator and to implement it onto an RGB LED matrix using 8 different colors instead of numbers.
- The additional goals, given enough time, are to create different difficulty settings, chosen by pressing different buttons on the LPC, and a graphic on the LED board for successfully completing the Sudoku

Group Responsibilities

Ryan - Algorithm developer for Sudoku Puzzles, in addition to helping others based on need
Jerry - Interfacing with LPC
Lillian - Blog administrator and Interfacing with LPC
Everyone - Debugging :(