A Game of Pong on Arduino

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Project Overview: HW and SW

● The objective of this project was to create a working game of Pong on Arduino, using custom hardware to serve as the display.
● Display board is made of an 8x12 array of LEDs, using a BJT switch circuit as the base for each LED. Components manually soldered together.
● Two methods of input: motion based IR controls and analog joystick controls. IR control uses an IR emitter and two IR receivers (photodiodes) in parallax.
● Game will have a score display, pause button, and increasing difficulty.
● Display board works by time splicing the columns in software: columns switch on and off sequentially such that only one is on at a time for 1 ms. Rows switch on or off based on current column being powered on.
● Software consists of two parts: custom library for LED Array and Pong code.
Motivation and Related Work

- Motivation: This project is fun and the end result is useful for entertainment. Plus, we have a strong interest in video games in general.
- There are a few tutorials online about how to create Pong with Arduino, or even other embedded hardware platforms like RPi. However, the choice of display greatly varied, with many of them involving more complex displays.
- An example tutorial: http://tinyurl.com/k4l2yyf
- None of them (the ones we found anyway) feature custom made hardware (for the display), and used pre-made arrays if LEDs were used.
- All code provided vary greatly depending on hardware used. None of the ones we found feature custom made libraries.
Block Diagram

Joysticks

IR Emitters

Parallax IR Receivers

Arduino board is a Mega 2560 board.

Each LED in the LED array has two digital inputs from the Arduino: row and column. Both must be one to turn on the LED.

GND
5V

Arduino

Row Pins

Column Pins

Joysticks operate using two potentiometers (X, Y axis) to generate analog signal to be read. Only one axis is used.

Parallax IR Receivers read from IR emitters and output an analog signal to the Arduino to control the paddles.

Pause feature is utilized as an interrupt on the Arduino.

Column Bus

Row Bus

LED Array
Results

- Pong game works and controls smoothly.
- Library for LED Array greatly simplified code needed to run game, but cannot automatically handle time splicing. Time splicing must be handled by main code block.
- The only fault is non-essential: it is impossible to display two numbers simultaneously without compromising the brightness on one side. Thus, the score is displayed one number at a time.
- IR Controls are less user-friendly than analog joystick controls, but still functional.