Wii Draw: Project Charter

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Project Goal

A user will be able to use a WiiMote to draw on a large screen of LEDs, changing colors depending on drawing mode and sensor input. Drawing modes could include monotone, color based on how fast the WiiMote is moving, color based on how the WiiMote is rotated (facing up for blue, down for red, for example), or user-selectable colors.

Project Approach

The project will determine the location on the screen at which a user is pointing a WiiMote by using its accelerometer and infrared camera. Based on other sensor input, the microcontroller will determine which pixels of the screen to light up, and what color to make them. Color can be based on user choice, WiiMote rotation, drawing speed, or other environmental input. Key performance metrics include pointing accuracy and how easy it feels to use. An initial focus on a small screen will allow us to first ensure a quality user experience before scaling up the size of the LED array.

Resources

The project will use an mbed FRMD KL25Z microcontroller from Freescale for computation and LED control, a bluetooth board, a Nintendo WiiMote as the sensor platform (including a 3-axis accelerometer, infrared camera, and several buttons), NeoPixel (or equivalent) individually-addressable RGB LEDs in a very large array as the screen, 5V power supplies sufficient to power the LEDs, and four clusters of infrared LEDs placed on the edges of the screen for determining WiiMote orientation. The four LEDs on the WiiMote can be used to indicate which "drawing mode" is active.

Schedule and Project Milestones

Oct 21: Project Charter
Oct 27: Finalize component selection, screen size
Oct 28: Inventory and order components
Nov 4: Complete model extended FSM
Nov 11: WiiMote communication and control
Nov 17: Correct WiiMote pointing
Nov 17: Complete screen construction
Nov 25: Microcontroller and screen communication
Dec 2: Monochrome drawing
Dec 9: Color drawing, drawing modes
Dec 16: Final systems testing and verification
Dec 17: Presentation
Dec 19: Report and Video completed

Risk and Feasibility

Acquiring the components in a timely manner might be tricky, especially if parts are ordered from overseas. The large number of LEDs will mean that a significant amount of power is required (each LED can consume up to 0.25W, and a display may have on the order of thousands of LEDS) so large power supplies will likely be required (we must also make sure that the screen will not overload a typical room's power circuit and cause a breaker to flip). Getting accurate enough WiiMote positioning may be very difficult—even while using the Wii itself control feels clunky and inaccurate. The mbed hardware might not have enough memory (16K) to hold the display buffer, but the Teensy 3.1 by PJRC (`http://www.pjrc.com/teensy/teensy31.html`) is an alternative option with 64K of memory, based on the 72 MHz ARM Cortex-M4, and is reasonably priced ($19.80).