What is Wiisel?

Wiisel = Wiimote + Neopixel Screen
What is Wiisel?
Original Goal

- 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 or rotating
Project Structure

Wiimote

Bluetooth

mbed FRMD-KL25Z

Data Signal

LED Array

Human User

Visual

·Movement·

Flash Memory – LED Values
Project Structure - Details

Diagram showing the flow of data and processes:
- Wiimote connected to Human Interface via Movement.
- Human Interface connected to LED Array via Visual.
- Reports/Bluetooth from Wiimote to Human Interface.
- Data Signal from LED Array to Human Interface.
- Bluetooth Interface connected to Processing.
- Raw Packets from Bluetooth Interface to Processing.
- Mapped Pixels from Processing to Multi_WS2811 Interface.
- mbed FRMD-KL25Z at the bottom.
Processing - FSM
Components

- 30 M of NeoPixels
- Freescale KL25Z board
- Wiimote
- Bluetooth 4.0 USB Dongle
Components: Screen

- 15m of 30 LED per meter
- 15m of 60 LED per meter
- Software handles mapping
Components: Screen

- Designing and Building the screen >250 hours
- Final Screen was easy to roll and carry around but needs ~10 minutes to set up.
Components: Screen

Power

- Theoretical current draw: 18 A - 54 A at 5V
- Reduced Peak usage by adjusting brightness of the LEDs in software

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>Full Brightness</td>
<td>93 W</td>
</tr>
<tr>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>15% Brightness</td>
<td>37 W</td>
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Components: Screen

Software:
- **Multi_WS2811**
  - Library allowing up to 16 strings of WS2811 or WS2812 LEDs to be driven from a single board.
  - Uses the board’s DMA to do full 800 KHz rate without much CPU burden.
  - By Ned Konz
<table>
<thead>
<tr>
<th></th>
<th>Library</th>
<th>Multi_WS2811</th>
<th>Modified Multi_WS2811</th>
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<tbody>
<tr>
<td>Percentage of RAM</td>
<td>98 %</td>
<td></td>
<td>59 % by moving constant array to flash and compressing colors</td>
</tr>
<tr>
<td>Number of Strips</td>
<td>16 Strips</td>
<td>16 Strips</td>
<td></td>
</tr>
<tr>
<td>LEDs per Strip</td>
<td>80 LEDs per Strip</td>
<td>90 LEDs per Strip</td>
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Components: Wiimote

- Mean of communication between screen and user.
- Communication between Wiimote and Mbed is done over Bluetooth using USB 4.0 Dongle.
- Roll + Pitch + Buttons of Wiimote are used as control input.
Components: Wiimote

- KL46Z - USBHost
  - Simple USBHost library for FRDM-KL46Z (FRDM-KL25Z)
  - By Norimasa Okamoto

- KL46Z-BTstack_example
  - Bluetooth Stack that is built on top of KL46Z-USBHost
  - Supports L2Cap protocol which is needed for Wiimote
  - By Norimasa Okamoto
What did we accomplish?

- Video1
- Video2
Extra: Bitmap Images!

42 Watts
33 Watts
40 Watts
25 Watts
Challenges

- Building the screen took a long time
- Soldering and Wiring
- Noise in Drawing mode
- Lack of documentation on libraries
- Memory Constraints
Future Work

- Use more sensors to make pointing and drawing easier.
  - IR sensor
- Display Text using simple text input
- Save drawings on an SD card