Application Notes for using EVE2 TFT modules with Gameduino2 library

Tested Platform Version: Gameduino2 Library: Version 1.0.2

The purpose of this document is to explain the steps required to use **Version 1.0.2** of the Gameduino2 library with any of our EVE2 TFT modules. The Gameduino2 library has been written by James Bowman for the FT80x/FT81x graphic controller IC series and contains support for various microcontrollers, along with many example sketches ranging from a simple "Hello World" program to more complicated programs using various widgets, accessing PNG files from a microSD card, and generating board game simulations. In this App Notes document, we will be using an Arduino Uno to drive our NHD-7.0-800480FT-CSXV-CTP EVE2 module and list the changes necessary in order to compile the basic 'Hello World' sketch.

Below is a list of hardware components & tools required for this demo:

- Newhaven Display NHD-7.0-800480FT-CSXV-CTP (Or any applicable Newhaven Display EVE2 TFT Modules)
- Newhaven Display 20 POS FFC
- Newhaven Display NHD-FT81x-Shield
- Arduino Uno
- USB 2.0 Cable Type A/B
- Arduino IDE tool installed
- Gameduino2 Library: Version 1.0.2

-Applicable Displays

3.5" TFT	4.3" TFT	5.0" TFT	7.0" TFT
NHD-3.5-320240FT-CTXL-T	NHD-4.3-480272FT-CTXL-T	NHD-5.0-800480FT-CTXL-T	NHD-7.0-800480FT-CTXL-T
NHD-3.5-320240FT-CSXV-T	NHD-4.3-480272FT-CSXV-T	NHD-5.0-800480FT-CSXN-T	NHD-7.0-800480FT-CSXV-T
NHD-3.5-320240FT-CSXN-T	NHD-4.3-480272FT-CSXN-T	NHD-5.0-800480FT-CTXL-CTP	NHD-7.0-800480FT-CSXN-T
NHD-3.5-320240FT-CTXL-CTP	NHD-4.3-480272FT-CTXL-CTP	NHD-5.0-800480FT-CSXN-CTP	NHD-7.0-800480FT-CTXL-CTP
NHD-3.5-320240FT-CSXV-CTP	NHD-4.3-480272FT-CSXV-CTP		NHD-7.0-800480FT-CSXV-CTP
NHD-3.5-320240FT-CSXN-CTP	NHD-4.3-480272FT-CSXN-CTP		NHD-7.0-800480FT-CSXN-CTP
	NHD-4.3-800480FT-CSXP-CTP		

Once the library is downloaded, extract and copy the Gameduino2 folder into your Arduino libraries folder. For more details, see this tutorial at: https://www.arduino.cc/en/guide/libraries.

Before running any of the example sketches, listed below are the changes required to two files in order to make the Gameduino2 library compatible with our EVE2 displays:

Note: The following example will reference the registers used for our 7.0" EVE2 TFT registers as an example.

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Elgin, IL 60124
Ph: 847.844.8795
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- wiring.h (Transports -> wiring.h)

- Open the wiring.h file and edit the following:
  - Uncomment the default CS definition and insert a new line redefining CS pin definition to 10 within the 'else' definition.

```
#ifndef CS
#if defined(ESP8266)
#define CS D8
#else
//#define CS 8
#define CS 10

```

-GD2.cpp

- Open the GD.cpp file and include / edit the following:
  - Uncomment the default SD definition, and insert a new line redefining SD pin definition to 5 within the 'else' definition.

```
#if defined(ESP8266)
#define SD_PIN        D9    // pin used for the microSD enable signal
#else
//#define SD_PIN          9
#define SD_PIN        5
#endif
```

- **NOTE**: If you are using our 4.3" EVE2 TFT module with 480x272 pixel resolution, the additional steps below are unnecessary as the default Gameduino2 library is configured for a 4.3" TFT display timings. Otherwise, proceed with the following steps:

  - Insert a new line where the pre-configured boards are defined with a custom board name with a defined number like below (EX: Board_NHD_7 2)

```
#define BOARD_NHD_7       2
#define BOARD_FTDI_80x    1
#define BOARD_GAMEDUINO23 0

```

  - On the following lines, comment out the unused pre-configured boards and define the custom board in the following format:

```
//#define BOARD         BOARD_GAMEDUINO23 // board, from above
//#define BOARD           BOARD_FTDI_80x  // board, from above
#define BOARD         BOARD_NHD_7
#define STORAGE       1                 // Want SD storage?
#define CALIBRATION   1                 // Want touchscreen?

```

- Scroll down to the **void GDClass::begin(uint8_t options)** to Line 523:

```
523  void GDClass::begin(uint8_t options) {
```

- Under the **#endif** statement of the pre-configured FT_80x board within the **GDClass::begin function**, insert a new **#if** statement using the custom board name and include the respective displays registers exactly as shown below, followed by an **#endif** line to conclude the **if** statement. The necessary inclusions can also be copied and pasted from the Full EVE2 TFT Registers table in the next section.

```
542  #if (BOARD == BOARD_FTDI_80x)
543    GDTR.wr(REG_PCLK_POL, 1);
544    GDTR.wr(REG_PCLK, 5);
545  #endif
546
547  #if (BOARD == BOARD_NHD_7)
548   GDTR.wr16(REG_HCYCLE, 928);
549   GDTR.wr16(REG_HOFFSET, 88);
550   GDTR.wr16(REG_HSIZE, 800);
551   GDTR.wr16(REG_HSYNC0, 0);
552   GDTR.wr16(REG_HSYNC1, 48);
553   GDTR.wr16(REG_VCYCLE, 525);
554   GDTR.wr16(REG_VOFFSET, 32);
555   GDTR.wr16(REG_VSIZE, 480);
556   GDTR.wr16(REG_VSYNC0, 0);
557   GDTR.wr16(REG_VSYNC1, 3);
558   GDTR.wr(REG_CSPREAD, 0);
559   GDTR.wr(REG_DITHER, 1);
560   GDTR.wr(REG_PCLK_POL, 1);
561   GDTR.wr(REG_PCLK, 2);
562   GDTR.wr(REG_SWIZZLE, 0);
563  #endif
```

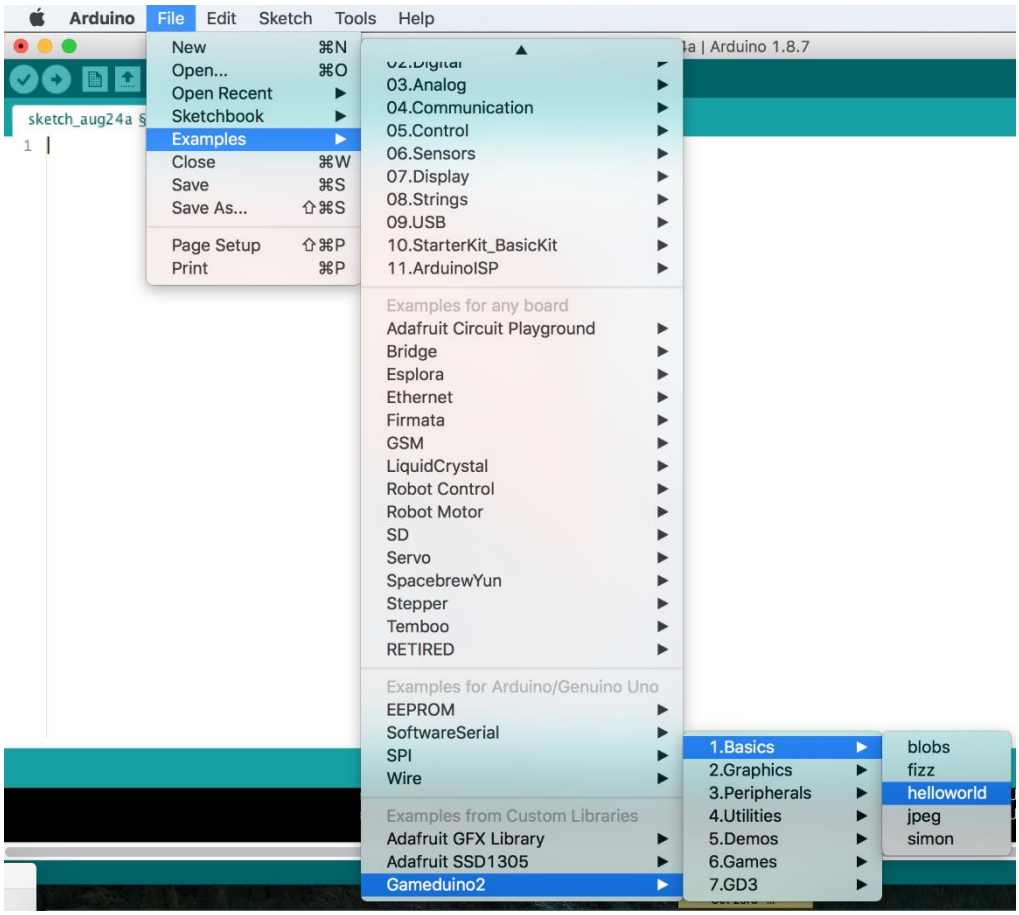
-Full EVE2 TFT Registers

- The required registers for each respective display can be copied from below into the **GDClass::begin** function:

3.5" TFT 320 x 240	4.3" TFT 480 x 272	4.3" TFT 800 x 480	5.0" TFT 800 x 480	7.0" TFT 800 x 480
GDTR.wr16(REG_HCYCLE, 408); GDTR.wr16(REG_HOFFSET, 70); GDTR.wr16(REG_HSIZE, 320); GDTR.wr16(REG_HSYNC0, 0); GDTR.wr16(REG_HSYNC1, 10); GDTR.wr16(REG_VCYCLE, 263); GDTR.wr16(REG_VOFFSET, 13); GDTR.wr16(REG_VSIZE, 240); GDTR.wr16(REG_VSYNC0, 0); GDTR.wr16(REG_VSYNC1, 2); GDTR.wr(REG_CSPREAD, 1); GDTR.wr(REG_DITHER, 1); GDTR.wr(REG_PCLK_POL, 0); GDTR.wr(REG_PCLK, 8); GDTR.wr(REG_SWIZZLE, 2);	GDTR.wr16(REG_HCYCLE, 548); GDTR.wr16(REG_HOFFSET, 43); GDTR.wr16(REG_HSIZE, 480); GDTR.wr16(REG_HSYNC0, 0); GDTR.wr16(REG_HSYNC1, 41); GDTR.wr16(REG_VCYCLE, 292); GDTR.wr16(REG_VOFFSET, 12); GDTR.wr16(REG_VSIZE, 272); GDTR.wr16(REG_VSYNC0, 0); GDTR.wr16(REG_VSYNC1, 10); GDTR.wr(REG_CSPREAD, 1); GDTR.wr(REG_DITHER, 1); GDTR.wr(REG_PCLK_POL, 1); GDTR.wr(REG_PCLK, 5); GDTR.wr(REG_SWIZZLE, 0);	GDTR.wr16(REG_HCYCLE, 928); GDTR.wr16(REG_HOFFSET, 88); GDTR.wr16(REG_HSIZE, 800); GDTR.wr16(REG_HSYNC0, 0); GDTR.wr16(REG_HSYNC1, 48); GDTR.wr16(REG_VCYCLE, 525); GDTR.wr16(REG_VOFFSET, 32); GDTR.wr16(REG_VSIZE, 480); GDTR.wr16(REG_VSYNC0, 0); GDTR.wr16(REG_VSYNC1, 3); GDTR.wr(REG_CSPREAD, 0); GDTR.wr(REG_DITHER, 1); GDTR.wr(REG_PCLK_POL, 1); GDTR.wr(REG_PCLK, 2); GDTR.wr(REG_SWIZZLE, 0);	GDTR.wr16(REG_HCYCLE, 928); GDTR.wr16(REG_HOFFSET, 88); GDTR.wr16(REG_HSIZE, 800); GDTR.wr16(REG_HSYNC0, 0); GDTR.wr16(REG_HSYNC1, 48); GDTR.wr16(REG_VCYCLE, 525); GDTR.wr16(REG_VOFFSET, 32); GDTR.wr16(REG_VSIZE, 480); GDTR.wr16(REG_VSYNC0, 0); GDTR.wr16(REG_VSYNC1, 3); GDTR.wr(REG_CSPREAD, 0); GDTR.wr(REG_DITHER, 1); GDTR.wr(REG_PCLK_POL, 0); GDTR.wr(REG_PCLK, 2); GDTR.wr(REG_SWIZZLE, 0);	GDTR.wr16(REG_HCYCLE, 928); GDTR.wr16(REG_HOFFSET, 88); GDTR.wr16(REG_HSIZE, 800); GDTR.wr16(REG_HSYNC0, 0); GDTR.wr16(REG_HSYNC1, 48); GDTR.wr16(REG_VCYCLE, 525); GDTR.wr16(REG_VOFFSET, 32); GDTR.wr16(REG_VSIZE, 480); GDTR.wr16(REG_VSYNC0, 0); GDTR.wr16(REG_VSYNC1, 3); GDTR.wr(REG_CSPREAD, 0); GDTR.wr(REG_DITHER, 1); GDTR.wr(REG_PCLK_POL, 1); GDTR.wr(REG_PCLK, 2); GDTR.wr(REG_SWIZZLE, 0);

-Hello World Test

- Once the above modifications have been made to each respective file, open the Arduino IDE and proceed to test the 'Hello World' sketch
    - **"Files -> Examples -> Gameduino2 -> Basics -> HelloWorld"**



- If the modifications were successful, you should expect to see the following on the EVE2 TFT Display:

-Software Disclaimer

Please note the Gameduino2 library was designed and created by James Bowman. Newhaven Display International, Inc. does not create or maintain any parts of this software. For any additional software support relating to the Gameduino2 library, please contact James Bowman.

-Reference Links

- Gameduino2 Homepage: https://excamera.com/sphinx/gameduino2/code.html
- Gameduino2 Github Page: https://github.com/jamesbowman/gd2-lib/tree/master/contrib
- Gameduino2 Cookbook: https://excamera.com/files/gd2book_v0.pdf
- FTDI EVE2 Example Files: https://github.com/NewhavenDisplay/EVE2-TFT-Modules

For additional support on using our EVE2 series TFT displays or questions about our other display products, please contact us through any of our technical support channels listed below:

Email: techsupport@newhavendisplay.com
Phone: (847) 844-8795
Forum: https://www.newhavendisplay.com/NHD_forum